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NATIONAL TRANSPORTATION SAFETY COMMITTEE

Aircraft Accident Investigation Report

**PT. ASI Pudjiastuti Aviation
C208B Cessna Grand Caravan ; PK-VVG
Bilogai Airstrip, Sugapa
Papua
Republic of Indonesia**

26 November 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 3rd Floor, Jalan Medan Merdeka Timur No. 5 Jakarta 10110, Indonesia.

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GLOSSARY OF ABBREVIATIONS

AOC	Air Operator Certificate
ATC	Air Traffic Control
ATPL	Air Transport Pilot License
ATS	Air Traffic Service
BMKG	<i>Badan Meteorologi Klimatologi dan Geofisika</i> / Indonesia Meteorology, Climatology and Geophisic Agency
CASR	Civil Aviation Safety Regulation
CPL	Commercial Pilot License
COM	Company Operation Manual
CSN	Cycles Since New
CVR	Cockpit Voice Recorder
DGCA	Directorate General of Civil Aviation
FL	Flight Level
FDR	Flight Data Recorder
ICAO	International Civil Aviation Organization
IIC	Investigator in Charge
Kg	Kilogram(s)
Km	Kilometer(s)
Kts	Knots (NM/hour)
LT	Local Time
Mm	Millimeter(s)
MTOW	Maximum Take-off Weight
NM	Nautical mile(s)
KNKT / NTSC	<i>Komite Nasional Keselamatan Transportasi</i> National Transportation Safety Committee
°C	Degrees Celsius
PIC	Pilot in Command
QFE	Height above aerodrome elevation (or runway threshold elevation) based on local station pressure
QNH	Altitude above mean sea level based on local station pressure
S/N	Serial Number
SIC	Second in Command
TSN	Time Since New
UTC	Coordinated Universal Time
VFR	Visual Flight Rules
VMC	Visual Meteorological Conditions

INTRODUCTION

SYNOPSIS

On 26 November 2011 a Cessna 208B Grand Caravan aircraft was being operated by PT. ASI Pudjiastuti Aviation (Susi Air) registered PK-VVG, the flight route was Nabire to Bilogai as an unscheduled cargo flight. There were two pilots on board and the freight load was a mixture of food, palm oil, and cement.

The aircraft departed from Nabire at 2355 UTC (0855 LT), the estimate time of arrival of Bilogai was 0045 UTC.

At 0042 UTC the aircraft was reported above touchdown zone and the altitude recorded of 6,960 feet, direction 277 degrees and air speed 94 knots. The aircraft executed a go around due to an unauthorized person entering the shoulder of the runway 27, the aircraft then continued to climb and headed left. It was reported while the aircraft initially was climbing with the nose up but following lost altitude. During go around manoeuvre the aircraft attitude was in high nose up position, caused the angle of attack was too high and beyond a stall margins caused the aircraft stall.

The aircraft bank to the right and crashed on a corn farm at coordinate S 03 44.58 E 137 0.96 and altitude about 6,550 feet with heading about 260 degrees. The aircraft was destroyed on impact with the ground. The captain seriously injured and still on seat in the aircraft wearing the shoulder harness. The second in command was fatally injured outside of the aircraft at the crashed site.

The operator of the aircraft has released several safety actions regarding this accident, and the NTSC issued safety recommendation to address safety issues identified in this report.

NTSC recommends that Directorate General of Civil Aviation should assure that unauthorised person entering onto active runway in Bilogai/Sugapa Airport was prohibited and prevented by any mean or at least a warning signal should be available to alert any people not to enter the runway when the aircraft on approach or prior take off.

1 FACTUAL INFORMATION

1.1 HISTORY OF THE FLIGHT

On 26 November 2011 a Cessna 208B Grand Caravan aircraft was being operated by PT. ASI Pudjiastuti Aviation (Susi Air) registered PK-VVG, the flight route was Nabire to Bilogai as an unscheduled cargo flight. There were two pilots on board and the freight load was a mixture of food, palm oil, and cement.

The aircraft departed from Nabire at 0855 LT (2355 UTC)¹, the estimate time of arrival of Bilogai was 0045 UTC.

At 0042 UTC the aircraft reported above touchdown zone and the altitude recorded on 6,960 feet (10 feet AGL) on direction 277 degrees with air speed 94 knots. The aircraft executed Go Around since there was a local villager walking parallel at about two meter on the right of the Runway 27.

The aircraft continued climb and headed left. It was reported while the aircraft initially was climbing with the nose up but following lost altitude. The aircraft bank to the right and crashed on a corn farm on coordinate S 03 44.58 E 137 0.96 with altitude about 6550 feet on heading about 260 degrees. The aircraft was destroyed on impact with the ground. The captain seriously injured and still on seat in the aircraft wearing the shoulder harness. The second in command was fatally injured outside of the aircraft at the crashed site.



Figure 1: The typical of Cessna 208B Grand Caravan

¹ The 24-hour clock in Coordinated Universal Time (UTC) is used in this report to describe the local time as specific events occurred. Indonesia Eastern Standard Time (Waktu Indonesia Timur/WIT) is UTC +9 hours. Therefore, 2355 UTC on 25 November 2012 was 0855 local time on 26 November 2012.

1.2 INJURIES TO PERSONS

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

Second in command was fatally injured.

1.3 DAMAGE TO AIRCRAFT

The aircraft was destroyed.

1.4 OTHER DAMAGE

No other damage reported on this accident.

1.5 PERSONNEL INFORMATION

1.5.1 Pilot in command

Gender : Male
Date of birth : 05 August 1980
Nationality : New Zealand
License : CPL
Date of issue : TBA
Valid to : 30 November 2012
Aircraft type rating : C208B/Single Engine Land
Medical certificate : Valid
Date of medical : 05 October 2011
Valid until : 05 March 2012
Last proficiency check : 01 October 2011
Total hours : 1859.5 hours
This make and model : 1.550 hours
Last 90 days : 107.3 hours
Last 24 hours : 2.3 hours
This flight : 0.8 hours

1.5.2 Second in command

Gender	: Male
Date of birth	: 20 July 1987
Nationality	: Spanish
License	: CPL
Date of issue	: TBA
Aircraft type rating	: C208B/Single Engine Land
Medical certificate	: Valid
Date of medical	: 04 July 2011
Valid to	: 04 December 2011
Last proficiency check	: 07 August 2011
Total hours	: 690 hours 36 minutes
This make and model	: 231 hours
Last 90 days	: 190 hours 42 minutes
Last 24 hours	: 4 hours 18 minutes
This flight	: 0 hours 48 minutes

1.6 AIRCRAFT INFORMATION

1.6.1 General

Aircraft Registration	: PK-VVG
Country of Manufacturer	: United States of America
Manufacturer	: Cessna Aircraft Company
Type/ Model	: C208B Grand Caravan
Serial Number	: 208B1308
Year of Manufacture	: 2008
Certificate of Airworthiness validity	: 08 September 2012
Certificate of Registration	: 08 September 2012
Total flying hours since manufacture	: 4,331 hours 18 minutes
Total cycle since new	: 5,375 cycles

1.6.2 Engines

Engine type	:	Turboprop Engine
Manufacturer	:	Pratt & Whitney Canada
Model	:	PT6A-114A
Serial Number	:	PCE-PC1476
Time Since New (TSN)	:	4,331 hours 18 minutes
Cycle since new (CSN)	:	5,375 cycles

1.6.3 Weight and Balance

The load calculation executed in the Weight and Balance form.

1.7 METEOROLOGICAL INFORMATION

The weather provided by phone from Susi Air Ground Personnel prior to departure to Bilogai. At the time of accident the weather reported on good condition.

1.8 AIDS TO NAVIGATION

Not relevant to this accident.

1.9 COMMUNICATIONS

There was no two ways communication between aircraft and Bilogai Ground Station, to maintain the operation safety they communicate among other aircraft used 122.4 Mhz VHF.

The communication of incoming and outgoing Susi Air aircraft from and to Bilogai, was only to Susi Air ground handling agent at Sugapa.

1.10 AERODROME INFORMATION

Aerodrome Name : Bilogai
Aerodrome Identification : BIL
Elevation : 6950 ft
Aerodrome Operator : Directorate General Civil Aviation
Runway Directions : 09 – 27
Runway Length : 590 meters
Runway Width : 18 meters
Surface : Hard Gravel/Clay



Figure 2: The walking direction of local people

There were no fences and no warning sound signal/sirens to alert the local people which on the runway area during aircraft takeoff and landing.

Nearby the runway, there is a local farm field owned by local people that they crossed the runway to go through the area.

1.11 FLIGHT RECORDERS

The aircraft had no Cockpit Voice Recorder (CVR) and no Flight Data Recorder (FDR) installed. Neither recorder was required by Indonesian regulations.

1.12 WRECKAGE AND IMPACT INFORMATION

The wreckage was in two areas separated by a large tree trunk with the diameter about 1 meter. The fuselage, tail plane, roof and main landing gear were located at northern side of the tree while the wings, nose landing gear, cockpit completed with engine and propeller were situated at southern side of the tree.



Figure 4: The accident site

The aft fuselage and tail plane were aligned almost parallel with the trunk and the tail plane pointing to 120°.

The fuselage had broken up, but the roof was still intact, showing clean separation and no evidence of twisting.

The wings were lying in V pattern with the left hand wing inverted and outer end facing 120°. Most of the outboard section of the wing up to flaps was damage.

The cockpit was facing 340° and complete with engine and propeller, although partly buried in the mud, exhibited distortion consistent with being under power at the time of impact.

The lock-wire of the emergency power lever was broken. The flap selector was found set at 20°. The legs of the captain seat had collapsed. The floor below second in command seat had been pushed upward by impact.

The second in command control column had dislodged from the instrument panel in a full back position. The control for the inertial separator was unlocked.

1.13 MEDICAL AND PATHOLOGICAL INFORMATION

The pilot suffered a fractured shoulder, fractures to number 1 and 3 vertebrae and brain bleeding as result of brain jarring during impact.

The second in command had suffered external bruising and blisters. There were other internal problems, but cause of death was bruising of the brain's medulla oblongata from impact with the spine and extensive brain haemorrhaging. This type of injury occurs when a person a seated upright and subject to high vertical impact brace.

1.14 FIRE

There was no pre or post impact fire on this accident.

1.15 SURVIVAL ASPECTS

The PIC was still on the seat wearing the shoulder harness and still survived, the SIC was fatally injured and found outside the aircraft.

The PIC was evacuated by helicopter initially to Bilogai airstrip, and then to the Tembagapura hospital. The SIC was evacuated by local people to Bilogai Airstrip, and then flown to Nabire.

1.16 TESTS AND RESEARCH

Not relevant to this occurrence.

1.17 ORGANIZATIONAL AND MANAGEMENT INFORMATION

Aircraft owner : PT. ASI Pudjiastuti Aviation
Aircraft operator : PT. ASI Pudjiastuti Aviation
Jl. Merdeka 312 Pangandaran, West java
Air operator certificate : AOC/135 – 028

1.18 ADDITIONAL INFORMATION

1.18.1 Aircraft System

- The left crew seat shoulder harness had been cut for evacuation purposed.
- The right crew seat shoulder harness was still complete installed on it.
- Blue Sky Network used to be a flight following, and provide data for the Search and Rescue. The blue sky data at 00.42 UTC , altitude 6,960 feet, 277 degrees and Air Speed 94 knots, at 00.43 UTC altitude 7.200 fit, 237 degrees and Air Speed 91 knots,
- ADAS provided the engine trend monitoring data will be included on final report.

1.18.2 Operation

As regulated under CASR 91.105 about Flight Crewmembers at Stations, stated on paragraph b as follows;

Each required flight crewmember of an Indonesian registered civil aircraft shall, during takeoff and landing, keep his or her shoulder harness fastened while at his or her assigned duty station. This paragraph does not apply if;

- 1) The seat at the crewmember's station is not equipped with a shoulder harness; or*
- 2) The crewmember would be unable to perform required duties with the shoulder harness fastened.*

Special procedures apply due to terrain as in many other airstrips in the mountainous regions. At the Bilogai airstrip for a C208, a Go Around procedure is only possible before reaching a point (committed point) on short final. The Go Around procedure then is to execute a right turn. After that committed point up to touchdown & rollout, a Go Around is not possible and the airplane is committed to land. The aircraft attempted to carry out a Go Around after passing the committed point.

The operator procedure of Terrain Pull Up Crew Coordination.

 PT ASI Pudjastuti Aviation	Standard Operating Procedures Cessna C-208B Grand Caravan	Document No. SOP-C208B 10-7																				
<table border="1" style="margin: auto;"> <tr> <th colspan="2" style="background-color: red; color: white;">TERRAIN PULL UP</th> </tr> <tr> <th colspan="2">Crew Coordination</th> </tr> <tr> <td style="width: 50%;">PF:</td> <td style="width: 50%;">PM:</td> </tr> <tr> <td>1. Disengage Autopilot</td> <td>1. Ensure MAX Power set</td> </tr> <tr> <td>2. Level Wings and simultaneously</td> <td>2. CALL OUT OMITTED ITEMS</td> </tr> <tr> <td>3. Airspeed 72 KIAS or stall warning whichever occurs first (respect the stall warning)</td> <td>3. MONITOR DISPLAY AND RAD ALT (if installed) and call trends</td> </tr> <tr> <td>4. MAX Power</td> <td></td> </tr> <tr> <td>5. DO NOT CHANGE CONFIGURATION</td> <td></td> </tr> <tr> <td>6. CLIMB UNTIL ABOVE MSA OR VISUAL AND warnings stop.</td> <td></td> </tr> <tr> <td colspan="2">If climb is insufficient: increase power to the firewall and increase pitch to the stall warning immediately checking forward on the first sound of the stall, then repeat the procedure</td> </tr> </table> <p style="text-align: center;">NOTE</p> <p>A "Caution Terrain" warning may develop into a "Terrain Pull Up" warning. If this happens you must level your wings and carry out the "Terrain Pull Up" maneuver.</p> <p style="text-align: center;">WARNING</p> <p>Additionally the stall warning may occur before reaching 72 KIAS (Especially if the aircrafts wings are not level)</p>			TERRAIN PULL UP		Crew Coordination		PF:	PM:	1. Disengage Autopilot	1. Ensure MAX Power set	2. Level Wings and simultaneously	2. CALL OUT OMITTED ITEMS	3. Airspeed 72 KIAS or stall warning whichever occurs first (respect the stall warning)	3. MONITOR DISPLAY AND RAD ALT (if installed) and call trends	4. MAX Power		5. DO NOT CHANGE CONFIGURATION		6. CLIMB UNTIL ABOVE MSA OR VISUAL AND warnings stop.		If climb is insufficient: increase power to the firewall and increase pitch to the stall warning immediately checking forward on the first sound of the stall, then repeat the procedure	
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Revision 4	Date: Dec 20, 2010	Prepared by: DS	Checked by: CVS																			

Figure 5: Susi Air SOP Cessna C-208B Grand Caravan "Terrain Pull Up"

This basically instructs crews, if terrain contact is imminent / unavoidable, to fly the aircraft very slow and very close to stall speed to reduce the impact force (energy) due to speed.

1.19 USEFUL OR EFFECTIVE INVESTIGATION TECHNIQUES

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

2 ANALYSIS

The aircraft was in airworthy condition prior departure, on final approached runway 27 at about ten meters above the surface, PIC decided to execute go around due to a people walking at the shoulder on the right side of the runway27. Then the aircraft climbed and turned to the left proceeded to the downwind.

The witness saw that the aircraft in the nose up position and turning to the right, subsequently the aircraft dropped and crashed. He also explained that the aircraft attitude was in high nose up position, it might make the aircraft stall to the right (turning stall).

The propeller was partly buried in the mud and bent, and it indicated that the engine was still in power at the time of impact.

At the time of accident, the weather was good.

There was no warning signal to alert if unauthorized persons entering the runway, especially during any aircraft take off and landing.

After the aircraft impacted terrain, the captain survived and still on seat wearing the shoulder harness. The SIC was ejected from the aircraft by the force of the impact and sustained fatal injuries. The SIC crew seat shoulder harness was still intact, with no indication of damage.

3 CONCLUSIONS

3.1 FINDINGS

- The aircraft was airworthy prior the accident and there was no evidence of system malfunction during the flight.
- The crew had valid license and medical certificate.
- There were no fences at the airport perimeter.
- There was a local plantation area nearby the runway.
- Unauthorized person entering the shoulder of the runway 27.
- There was no warning signal to alert if unauthorized persons entering the runway, especially during any aircraft Takeoff and Landing.
- The valley (gap) on the south side of the runway was too narrow for successful go around manoeuvre by a caravan aircraft.
- The aircraft most probably stalled due to very high angle of attack, when the aircraft was manoeuvre to avoid the surrounding terrain and bank to the right.
- The communication of incoming and outgoing Susi Air aircraft from and to Bilogai was only to Susi Air ground handling Agent at Sugapa.

3.2 CAUSES

The aircraft was executed a Go Around due to a unauthorized person entering the shoulder of the runway 27, after go around, crew tried to avoid terrain impact, increasing the aircraft attitude more pitching up caused the angle of attack was higher and beyond a stall margins , finally stall just before impact.

4 SAFETY ACTION

At the time of issuing this Draft Final Accident Investigation Report, the National Transportation Safety Committee had been informed of safety actions resulting from this accident from the parties.

4.1 DIRECTORATE GENERAL CIVIL AVIATION, DIRECTORATE AIRWORTHINESS AND AIRCRAFT OPERATION

The Directorate Airworthiness and Aircraft Operation had performed a special audit through PT. Pujiastuti Aviation organization such as Maintenance, Operation and Safety Department.

4.2 PT.ASI PUJIASTUTI AVIATION

Referred to PT. ASI Pudjiastuti Aviation letter dated Jakarta, 6th August 2012 related to the NTSC immediate recommendation of the PT. ASI Pudjiastuti aircraft accident, safety action was developed as follows:

- Mandatory over fly of all uncontrolled fields.

Standard Operating Procedure now for the following conditions: If an airfield has no abort /go-around possibility after a certain point on the approach, and has no active controller, the field must be over flown directly before landing. This is also necessary if the airfield has this go around possibility, but has a proven history of frequent aborted landings due to runway incursions.

- Evaluation of all airfields used regarding ‘single use’

Airfields have been evaluated and a number of them now designated „single use“. This means, if one other aircraft has already landed and is parked on the airfield, no other (Susi Air) aircraft may approach and land, due to the limits on emergency manoeuvre area on the airfields. Such airfields are: Bilogai, Sinak, Kenyam, Kiwirok. This is ongoing and part of the evaluation of any new airfield used by Susi Air.

- High altitude/heavy weight manoeuvres training.

Covered by training with MCCALL MOUNTAIN/CANYON FLIGHT TRAINING. Next planned in March 2013.

- Clarification/Re-issue of unclear approach plates.

Susi Air owned approach plates / airport information are currently being developed. One of the conditions of resuming operations into Bilogai airfield is a re-issued airport approach. This is yet to be completed.

- Better preparation of First Officers for flying in Papua.

First Officers now receive a specific induction before flying in Papua, given by the Papua instructor. All details and documentation is provided by the Papua Training Manual.

- Use the Blue Sky Quick Position button. More training around the use of Blue Sky.

The training of this item has not yet been completed to the satisfaction of Susi Air. The main goal of this recommendation was to train pilots to use the Bluesky Emergency Alert function more readily; in principle “If you even THINK you may be in trouble, press the button“. The accident of PK-VVQ has shown that pilots apparently still hesitate to press the emergency button even if clearly in an emergency. However, in one other incident more recently, the emergency button was utilized which may be a sign of better success of training. This item re-enforced in simulator training.

- Create a list of the 10 most needed airfield upgrades (e.g. radio and siren).

This list has been compiled by the Papua pilot group and will be submitted to the DGCA.

- Purchase of pulse light systems for Caravan aircraft and investigate use for Porter aircraft.

(Making aircraft easier to see on approach) Two company aircraft have been equipped on a trial basis, which was successful. A Purchase Order has been placed for this system for installation in all company aircraft, starting with Papua. Compliance target for Papua aircraft by the end of September 2012.

- Evaluate current line training, route checks and base checks for Papua Captains.

The Susi Air Papua Training Manual has been issued as a draft document in July 2011 (2 months before the PK-VVE accident) but had not been fully implemented at the time. The Training Manual has now been revised several times and has been last re-issued in June 2012. Minimum training times and completion standards now strictly adhered to. At this time, until more training experience has been acquired, minimum hours for Papua Captains has been increased to 1.500.

- Establish a mountain training course with an external provider for all Papua Captains.

In February 2012, 1 week of training was held with MCCALL MOUNTAIN/CANYON FLIGHT TRAINING. 3 highly qualified mountain training instructors came to Papua and trained all current captains, and provided new training methods and insight (also used to improve the training program / manual, recommendation 4). Another week was spent training in Kalimantan with the pilot group there. In total, over 60 Susi Air pilots participated directly in this training. Follow up training with the same company is planned for March 2013.

- Survival kits to be fitted to all aircraft as a matter of urgency.

All aircraft in Papua now carry survival kits (custom designed content for local conditions).

As a general additional remark, in July 2012 Susi Air has taken a custom-developed Caravan simulator into operation. This simulator has been in development for 2 years and will provide another large improvement in training for all pilots. This simulator is modelled on a C208 Caravan and has a large and realistic visual system. More than

that, As a world-first, this new simulator has a detailed Papua scenery, consisting of 20 mountain airports and their environment, enabling for the first time specific training for this kind of flying in a simulator.

Training has been identified as a common contributing factor in all 3 of the accidents, and Susi Air is committed to invest in the training improvements needed to ensure that no more accidents happen in the future.

5 SAFETY RECOMMENDATIONS

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

5.1 DIRECTORATE GENERAL OF CIVIL AVIATION

NTSC recommends that Directorate General of Civil Aviation should assure that unauthorised person entering onto active runway in Bilogai/Sogapa Airport was protected or prohibited by any mean or at least a warning signal should be available to alert any people not to enter the runway when the aircraft on approach or prior take off.