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KOMITE NASIONAL KESELAMATAN TRANSPORTASI

Runway Excursion Investigation Report

**PT. Sriwijaya Air
Boeing 737-400; PK-CKN
Supadio International Airport
Pontianak, West Kalimantan
Republic of Indonesia**

19 October 2012



KOMITE NASIONAL KESELAMATAN TRANSPORTASI
REPUBLIC OF INDONESIA
2014



This final report was produced by the Komite Nasional Keselamatan Transportasi (KNKT), 3rd Floor Ministry of Transportation, 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

AFDS	:	Autopilot Flight Director System
AOC	:	Air Operator Certificate
ARFF	:	Airport Rescue and Fire Fighting
ATPL	:	Air Transport Pilot License
ATS	:	Air Traffic Service
BKN	:	Broken
BMKG	:	<i>Badan Meterologi Klimatologi dan Geofisika</i> (Metrological Climatology and Geophysical Agency)
°C	:	Degrees Celsius
CAS	:	Calibrated Air Speed
CB	:	Cumulonimbus
CL	:	Classic
cm	:	Centimetre
CPL	:	Commercial Pilot License
CVR	:	Cockpit Voice Recorder
DGCA	:	Directorate General of Civil Aviation
FA	:	Flight Attendant
FCOM	:	Flight Crew Operations Manual
FCTM	:	Flight Crew Training Manual
FDR	:	Flight Data Recorder
ft	:	Feet
GE	:	General Electric
ICAO	:	International Civil Aviation Organization
IIC	:	Investigator in Charge
ILS	:	Instrument Landing System
IMC	:	Instrument Meteorological Condition
In Hg	:	Inch Hydrargyrum
Kg	:	Kilogram(s)
Km	:	Kilometer(s)
kts	:	Knots (nm/hours)
MAP	:	Missed Approach Point
mbs	:	Millibars
MDA	:	Minimum Descend Altitude

mHz	:	Mega Hertz
Mm	:	Millimeter(s)
Nm	:	Nautical mile(s)
NOTAM	:	Notice to Airman
KNKT	:	Komite Nasional Keselamatan Transportasi
Lbs	:	Pounds
PATS		Playback and Test System
PF	:	Pilot Flying
PIC	:	Pilot in Command
PM	:	Pilot Monitoring
psi	:	pound per square inch
QFE	:	Atmospheric pressure at aerodrome elevation (or at runway threshold) (pressure setting to indicate height above aerodrome)
QNH	:	Height above mean sea level based on local station pressure
QSS	:	Quality Safety and Security
SIC	:	Second in Command
S/N	:	Serial Number
SOP	:	Standard Operating Procedure
TSN	:	Time since New
TSRA	:	Thunderstorm Rain
USA	:	United States of America
UTC	:	Universal Time Coordinate
V _{REF}	:	Reference landing approach speed, all engines operating
VMC	:	Visual Meteorological Condition

INTRODUCTION

SYNOPSIS

On 19 October 2012 a Boeing 737-400 aircraft registered PK-CKN on flight number SJ182, was being operated by PT. Sriwijaya Air, as a schedule passenger flight from Soekarno-Hatta International Airport (WIII), Jakarta to Supadio International Airport (WIOO), Pontianak.

At 0735 UTC, the aircraft was pushed back at Soekarno-Hatta International Airport, on board the flight was 166 persons consisted of two pilots, four flight attendants, 160 passengers.

Based on interview, the pilots stated that while en-route they received the weather information from Air Traffic Controller which informing that current weather at Supadio Airport was raining and thunderstorm with the horizontal visibility 6 km.

The flight was vectored by Pontianak Approach to join the ILS runway 15 than contact to Supadio Tower when established localizer.

At 800 ft the pilot called Supadio Tower, that they could see the runway and then Supadio Tower replied by giving a landing clearance.

At 50 ft, the FDR recorded that the tail wind component was 10 knot and the aircraft speed 13 kts higher than the Target Vref. The aircraft stopped with the main wheels at about 2 meters from the end of stop-way runway 15 and the nose wheels sunk into the soft surface.

The investigation determined that there were no issues with the aircraft and all systems related to this occurrence. Therefore the discussion focused on the issues of: landing distance calculation, approach preparation and hydroplaning.

The investigation concluded that contributing factors was the absence of approach briefing particularly on reviewing of landing distance might have decreased the pilot's awareness toward better flight justification. This condition affected to the pilot justification which resulting the approach speed was 13 kts above Vref when the aircraft at 50 ft. And this particular condition was classified as un-stabilized approach and requires the pilot to go around.

Prior to issue this final investigation report, the KNKT had been informed of safety actions resulting of the internal investigation by the operators concerning to the operational safety related to this occurrence.

Included in this final report, the KNKT issued several safety recommendations to PT. Sriwijaya Air, Supadio Airport Authority, Pontianak and Directorate General of Civil Aviation to address the safety issues identified in this final report.

1 FACTUAL INFORMATION

1.1 History of the Flight

On 19 October 2012, a Boeing 737-400 aircraft registered PK-CKN on flight number SJ182, was being operated by PT. Sriwijaya Air, as a schedule passenger flight from Soekarno-Hatta International Airport (WIII), Jakarta to Supadio International Airport (WIOO), Pontianak¹.

At 0735 UTC², the aircraft was pushed back at Soekarno-Hatta International Airport with persons on board was 166, consisted of two pilots, four flight attendants, 156 adult passengers and 4 children. All of occupants were Indonesian except the Second in Command (SIC) was South Korean.

Based on interview, the pilots stated that while en-route the weather information was received as follows: wind 270°/5 kts, visibility 6 km, temperature 26/25, cloud CB 1,700 ft, QNH 1007 mbs, rain and thunderstorm.

The estimated landing weight was 120,000 lbs which was close to the maximum landing weight and considered to the weather condition, the pilots changed the auto brake setting to position 3 which was planned on position 2.

The pilots did not mention that they looked at the Boeing Flight Crew Operating Manual (FCOM) as reference.

The pilot was vectored by Pontianak Approach controller to intercept ILS runway 15. At 0938 UTC, the pilot made first contact with Supadio Tower³ controller and reported that the flight established on localizer ILS runway 15.

During conducted the approach, the weather was heavy rain. The pilot could see the runway at 800 ft and reported to the Supadio Tower controller. The controller then issued landing clearance. While on final approach position the pilot noticed on the Navigation Display that the wind was calm, while on short final the wind changed as the pilot felt the aircraft shaking.

At 50 ft, the Flight Data Recorder (FDR) recorded that the tail wind was 10 kts and also recorded Calibrated Air Speed (CAS) was 150 kts and the groundspeed was 163 kts. The Supadio Tower controller took picture of the aircraft from the tower with the mobile phone camera.

1 Supadio International Airport, Pontianak will be named as Pontianak for the purpose of this report.

2 The 24-hours clock in Universal Time Coordinated (UTC) is used in this report to describe the local time as specific events occurred. Local time is UTC+7 hours.

3 Supadio Tower is the radiotelephony call sign for the Supadio International Airport control tower.



Figure 1: The aircraft picture taken by tower controller prior to touchdown

At 0941 UTC, the aircraft touched down. The pilot deployed thrust reversers. The pilot did not feel aircraft deceleration. Realized that the end of runway was approaching, the pilot applied manual brake.

The aircraft stopped with the main wheels at about 2 meters from the end of stop-way runway 15 and the nose wheels sunk into the soft surface.

After the aircraft stopped, the Flight Attendant (FA) checked the outside condition and found that there was no fire. The condition outside was heavy rain and very limited visibility. The condition in the cabin was no damage and no fire. The FA1 announced and asked to passengers to keep calm. The PIC then called the FA 1 to come into the cockpit and was briefed that the aircraft has overrun and asked the FA1 to inform the passengers to keep stay on their seats.

The pilot contacted the Supadio Tower controller that they overrun. The tower controller pressed the crash bell and the Airport Rescue and Fire Fighting (ARFF) deployed from the site. The ARFF personnel assisted the passenger disembarkation. The passengers disembarked through passenger stair. No one injured in this serious incident.



Figure 2: Final position of the aircraft

1.2 Injuries to Persons

No one injured in this serious incident.

1.3 Damage to Aircraft

The aircraft had minor damaged, mostly on the nose wheel section. The details of the damages are as follows:

- The nose landing gear folded backward
- The nose wheel doors detached
- Reverted rubber found on the tire number two and number three (the inner main wheel).



Figure 3: The tire damage found at inner side of both main wheels

1.4 Other Damage

There was no other damage to property and/or the environment.

1.5 Personnel Information

1.5.1 Pilot in Command

Gender	: Male
Age	: 49 years old
Nationality	: Indonesia
Marital status	: Married
Date of joining company	: 15 September 2008
License	: ATPL
Validity of license	: 30 November 2012
Aircraft type rating	: B737-CL
Medical certificate	: First Class
Last of medical examination	: 14 September 2012
Validity of medical certificate	: 14 March 2013
Medical limitation	: The pilot shall possess glasses that correct for near vision
Last proficiency check	: 22 May 2012
Last line check	: 31 August 2012
Flying experience	
Total hours	: 16,700 hours
Total on type	: TBA
Last 90 days	: 202 hours 39 minutes
Last 60 days	: 126 hours 4 minutes
Last 24 hours	: 3 hours 25 minutes
This flight	: 1 hour 21 minutes

1.5.2 Second in Command

Gender : Male
Age : 31
Nationality : South Korean
Marital status : Single
Date of joining company : 8 March 2012
License : CPL
Validity of license : 19 March 2013
Aircraft type rating : B737-CL
Medical certificate : First Class
Last of medical examination : 19 September 2012
Validity of medical certificate : 19 March 2013
Medical limitation : NIL
Last proficiency check : 19 March 2012
Last line check : Under line training

Flying experience

Total hours : 370 hours
Total on type : TBA
Last 90 days : 127 hours
Last 60 days : 107 hours
Last 24 hours : 3 hours 25 minutes
This flight : 1 hour 21 minutes

1.6 Aircraft Information

1.6.1 General

Registration Mark : **PK-CKN**
Manufacturer : Boeing Aircraft Company
Country of Manufacturer : United State of America
Type/ Model : B737-400
Serial Number : 26281
Date of manufacture : 20 October 1992
Certificate of Airworthiness
 Issued : 01 December 2011
 Validity : 30 November 2012

Category	: Transport
Limitations	: NIL
Certificate of Registration	
Number	: 2986
Issued	: 01 December 2011
Validity	: 30 November 2012
Time Since New	: 49,904 hours 22 minutes
Cycles Since New	: 29,978 cycles
Last Minor Inspection	: A7 Check

1.6.2 Engines

Manufacturer	: GE-SNECMA
Type/Model	: CFM56-3
Serial Number-1 engine	: 857353
▪ Time Since New	: 42,875 hours 59 minutes
▪ Cycles Since New	: 24,384 cycles
Serial Number-2 engine	: 856472
▪ Time Since New	: 46,500 hours 59 minutes
▪ Cycles Since New	: 42,875 cycles

1.6.3 Weight and Balance

The aircraft departed from Soekarno-Hatta Airport Jakarta with total of 166 persons on board, included two pilots, four flight attendants, 156 adult and 4 children passengers. The aircraft also carried 20,119 kgs of fuel and 2,635 kgs luggage. The total takeoff weight was 127,220 lbs (57,706 kgs). The estimated landing weight at Pontianak was 119,501 lbs (54,205 kgs).

The aircraft was operating within the weight and balance envelop.

The aircraft landing weight of 119,501 lbs (54,205 kgs) which was closed to the maximum landing weight of the aircraft structure limitation would require landing speed of 137 kts.

1.7 Meteorological Information

Weather Report for Supadio International Airport, issued by Supadio Meteorological Station on 19 October 2012, as follows:

	0900 UTC	0930 UTC	1000 UTC
Wind	270 / 00	000 / 00	340 / 06
Visibility	06 KM	07 KM	1500 M
Weather	TSRA	TSRA	TSRA
Cloud	FEW CB 1,100 ft BKN 900 ft	FEW CB 1,000 ft BKN 900 ft	FEW CB 1,000 ft BKN 700 ft
TT/TD (°C)	28 / 25	27 / 25	26 / 24
QNH (mb/in Hg)	1007 / 29,74	1007/29,74	1008/29,77
QFE (mb/in Hg)	1007 / 29,74	1007/29,74	1008/29,77
Remarks	CB to North	CB to North	CB to North

1.8 Aids to Navigation

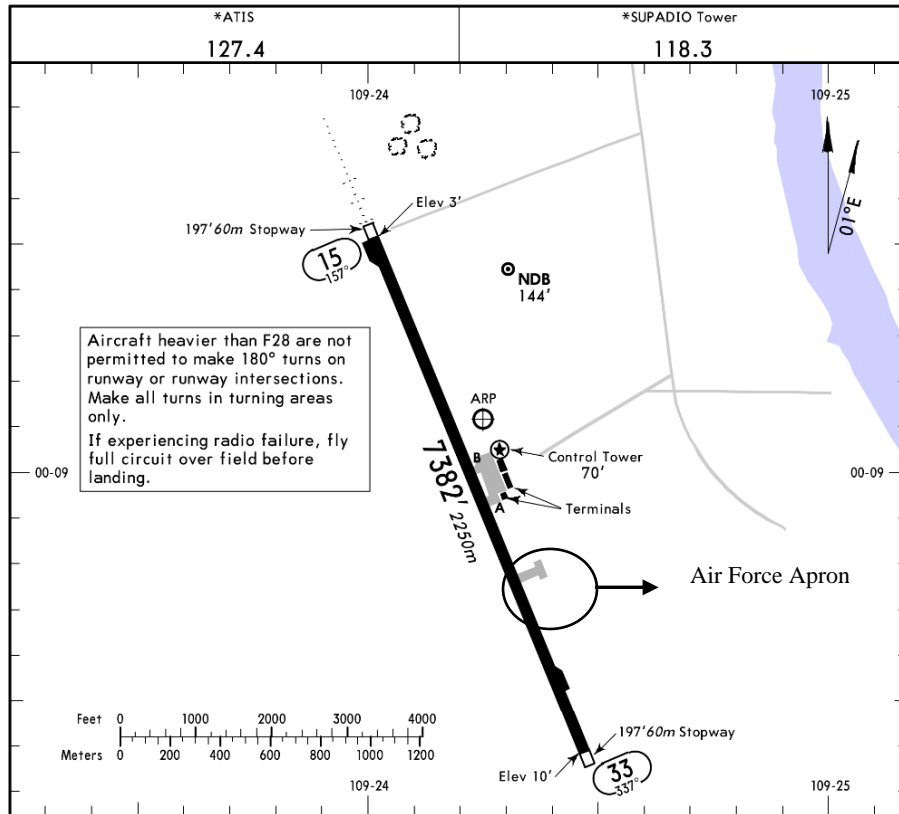
The navigation equipment installed at the Pontianak Airport and in the aircraft operated normally during the day of the serious incident. There was no report of abnormality or malfunction.

1.9 Communications

All communications between ATS and the crew were recorded by ground based automatic voice recording equipment for the duration of the flight. The quality of the aircraft's recorded transmissions was good.

1.10 Aerodrome Information

Airport Name	: Supadio International Airport
Airport Identification	: WIOO
Coordinate	: 00°08'53"S 109°24'15"E
Elevation	: 10 ft / 32°C
Airport Operator	: PT. Angkasa Pura II (Persero)
Runway Direction	: 156° and 336° (15-33)
Runway Length	: 2250 m (7382 ft)
Runway Width	: 45 m
Surface	: Asphalt concrete
Longitudinal Slope	: 0.03% up to runway 15
Transverse Slope	: 1%



ADDITIONAL RUNWAY INFORMATION

RWY		USABLE LENGTHS LANDING BEYOND			
		Threshold	Glide Slope	TAKE-OFF	WIDTH
15 ①②③	RL ALS PAPI		5167' 1575m		148'
33	RL REIL PAPI				45m

- ① Runway slippery during and shortly after rain.
- ② B737-200 and similar restricted to 100,000 lb take-off weight.
- ③ B737-300/400/500 restricted to 99,500 lb take-off weight.

TAKE-OFF

	AIR CARRIER (JAA)		AIR CARRIER (FAR 121)	
	LVP must be in Force All Rwys RCLM (Day only) or RL	All Rwys RCLM (Day only) or RL	All Rwys Adequate Vis Ref	
A				
B	RVR 250m	RVR 400m	2 Eng	400m
C			3 & 4 Eng	
D	RVR 300m			

CHANGES: Runway width.

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Figure 4: Aerodrome Layout

The KNKT investigators performed observation to the runway condition during a heavy rain one day after the occurrence. The observation found standing water at several areas in the runway and standing water approximately 15 cm on the intersection runway and taxiway Charlie which was the taxiway to Air Force apron (figure 5).



Figure 5: Standing water on intersection taxiway Charlie

Following this serious incident, the airport operation was closed until 1130 UTC. The Airport then reopen with displace threshold.

1.11 Flight Recorders

1.11.1 Flight Data Recorder

The aircraft was equipped with a Honeywell solid state flight data recorder. The recorder data was downloaded at KNKT recorder facilities in Jakarta.

The details of the FDR were:

Manufacturer : Honeywell
Type/Model : UFDR
Part Number : 980-4120-DXUN
Serial Number : 9322

During the final segment from approximately 300 ft of the flight the FDR recorded several significant events were as follows:

- a. The approach path was relatively steady.
- b. After passed 500 ft, the aircraft speed slightly increased.
- c. At 50 ft, the tail wind component was 10 kts the aircraft speed was 150 kts and ground speed 163 kts.
- d. The aircraft bounced for 2 seconds with aircraft speed was 143 kts and groundspeed 156 kts.

- e. During the landing roll, both thrust reversers were deployed and N2 recorded up to 96% and brake pressures were relatively equal up to maximum pressure of 3,000 psi.
- f. The longitudinal acceleration recorded approximately -0.3 G on the initial landing roll and gradually reduced to approximately -0.12 G. The longitudinal acceleration increased prior to aircraft stop.

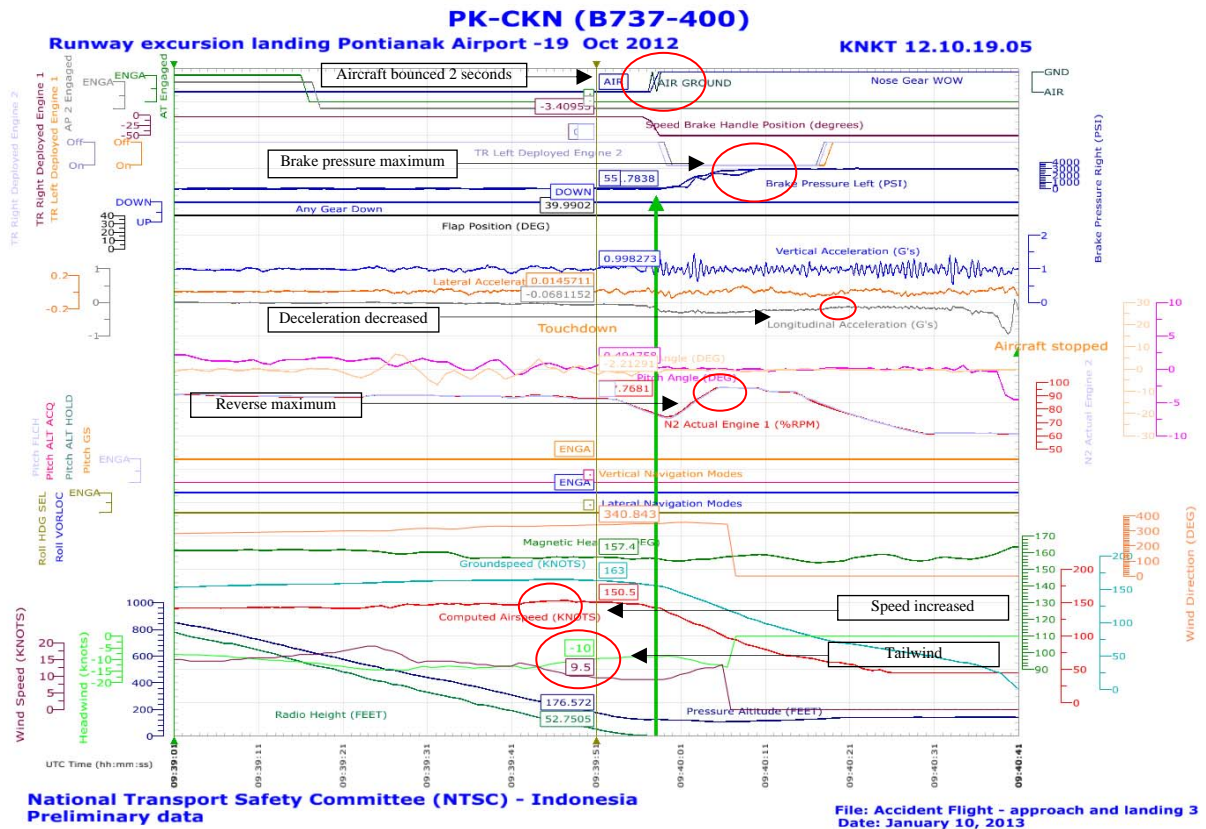


Figure 6: Graph of FDR data

1.11.2 Cockpit Voice Recorder

The aircraft was equipped with a Solid State Cockpit Voice Recorder (SSCVR).

The details of the CVR were:

- Manufacturer : Honeywell
- Type/Model : SSCVR
- Part Number : 980-6020-001
- Serial Number : 1968

The CVR was downloaded in the KNKT recorder facility used Honeywell Playback and Test System (PATS). The CVR contained about 30 minutes 30 seconds of audio. The voice data begin sometime after the aircraft stopped until the electrical power removed. The information during the flight and landing has been overwritten and could not be correlated with the FDR data.

1.12 Wreckage and Impact Information

The aircraft landed during raining condition, over run and stopped with the main wheels just about the end pavement of stop-way runway 15.

White mark of the tire was found on the runway.

The nose wheel sunk into the ground up to the nose belly. The number two and three main wheel tires were spot and found reverted rubber marks.

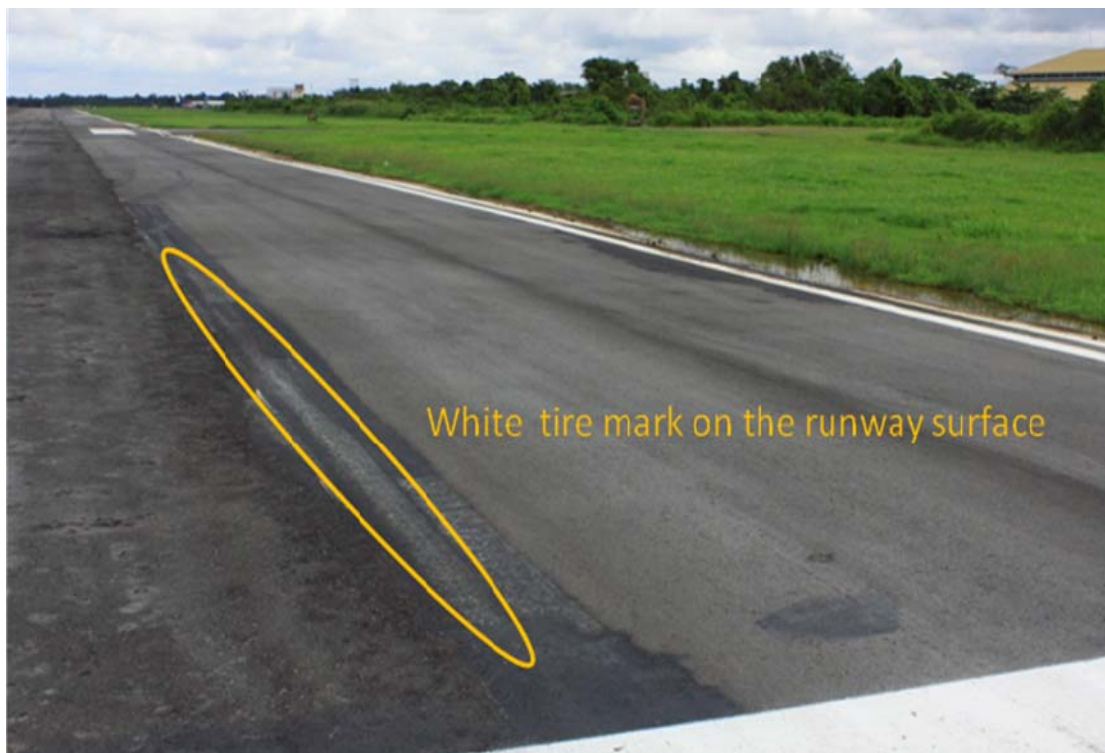


Figure 7: White mark on the runway



Figure 8: Spot and reverted rubber on the main wheel number 2



Figure 9: Spot and reverted rubber on the main wheel number 3

1.13 Medical and Pathological Information

No medical or pathological investigations were conducted as a result of this occurrence, nor were they required.

1.14 Fire

There was no evidence of pre or post impact fire during the occurrence.

1.15 Survival Aspects

After the aircraft stopped the crew evaluated the condition and considered safe. All occupants stayed in the aircraft until the Airport Rescue and Fire Fighting arrived.

All occupants disembark on the last aircraft position. No one injured in this serious incident.

1.16 Tests and Research

No other tests or research were required to be conducted as a result of this serious incident.

1.17 Organizational and Management Information

Aircraft Owner : Castle 2003-2A LLC
c/o Wilmington Trust Company
Address : 1100 North Market, Street Delaware
19890 – 1605 USA
Aircraft Operator : PT. Sriwijaya Air
Address : Jalan Pangeran Jayakarta No.68 C15-16
Mangga Dua Selatan, Jakarta Pusat,
Republic of Indonesia
Operator Certificate Number : AOC/121-035

1.18 Additional Information

1.18.1 Landing Distance Performance Table

737-400/CFM56-3_22K
FAA



Performance Inflight
Advisory Information

737 Flight Crew Operations Manual

ADVISORY INFORMATION

Normal Configuration Landing Distance

Flaps 40

Dry Runway

BRAKING CONFIGURATION	LANDING DISTANCE AND ADJUSTMENTS (FT)												
	REF DIST	WT ADJ	ALT ADJ	WIND ADJ PER 10 KTS		SLOPE ADJ PER 1%		TEMP ADJ PER 10°C		VREF ADJ	REVERSE THRUST ADJ		
				HEAD WIND	TAIL WIND	DOWN HILL	UP HILL	ABV ISA	BLW ISA		PER 10 KTS ABOVE VREF40	ONE REV	NO REV
	52000 KG LANDING WEIGHT	PER 5000 KG ABOVE/BELOW 52000 KG	PER 1000 FT ABOVE SEA LEVEL										
MAX MANUAL	2650	290/-150	50	-100	330	30	-30	50	-50	200	40	130	
MAX AUTO	3390	230/-220	70	-130	420	0	0	70	-70	330	0	10	
AUTOBRAKE 3	4730	350/-360	120	-210	710	20	-40	120	-120	510	40	60	
AUTOBRAKE 2	5640	470/-480	160	-270	930	100	-120	150	-150	500	210	210	
AUTOBRAKE 1	6110	550/-540	190	-320	1100	180	-190	170	-170	490	570	940	

Good Reported Braking Action

MAX MANUAL	3650	260/-250	90	-160	580	90	-80	80	-80	290	170	590	
MAX AUTO	3880	280/-270	100	-170	600	70	-60	90	-90	340	190	640	
AUTOBRAKE 3	4740	350/-360	120	-210	720	40	-40	120	-120	510	40	200	
AUTOBRAKE 2	5640	470/-480	160	-270	930	100	-120	150	-150	500	210	210	
AUTOBRAKE 1	6110	550/-540	190	-320	1100	180	-190	170	-170	490	570	940	

Medium Reported Braking Action

MAX MANUAL	4820	390/-380	130	-260	930	200	-160	120	-120	380	450	1800	
MAX AUTO	4860	400/-390	140	-260	940	180	-140	120	-120	440	440	1800	
AUTOBRAKE 3	5160	410/-400	140	-270	970	150	-120	130	-130	510	350	1770	
AUTOBRAKE 2	5790	480/-490	170	-300	1060	170	-170	160	-160	500	290	1180	
AUTOBRAKE 1	6140	560/-540	190	-320	1140	230	-210	170	-170	490	600	1460	

Poor Reported Braking Action

MAX MANUAL	6050	540/-510	180	-370	1430	450	-310	150	-160	440	880	4780	
MAX AUTO	6050	540/-510	180	-370	1430	450	-290	160	-160	460	880	4800	
AUTOBRAKE 3	6100	550/-520	190	-370	1440	440	-300	160	-160	480	910	4850	
AUTOBRAKE 2	6390	570/-550	190	-390	1470	420	-290	170	-170	500	740	4500	
AUTOBRAKE 1	6600	600/-590	210	-400	1510	450	-330	180	-180	490	870	4480	

Reference distance is for sea level, standard day, no wind or slope, VREF40 approach speed and two engine detent reverse thrust.

Max manual braking data valid for auto speedbrakes. Autobrakes data valid for both auto and manual speedbrakes.

For max manual braking and manual speedbrakes, increase reference landing distance by 260 ft.

Actual (unfactored) distances are shown.

Includes distance from 50 ft above threshold (1000 ft of air distance).

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January 28, 2011

D6-27370-301-PNM

PI.32.3

Figure 10: Landing distance performance table (Boeing Proprietary Copyright © Boeing : Reprinted with permission of The Boeing Company)

As shown on figure 10, the landing distance with landing weight 54,205 kgs and existing conditions required 7,083 ft.

1.18.2 Landing Data Card

Figure 11 below shows the landing data contains of the Vref and the aircraft configuration for the existed aircraft landing weight planned to land at Pontianak.

Sriwijaya Air 0900 LANDING DATA GKN0900 BOEING 737

FLIGHT NO.	182	WIND	270/05	QFE	
AIRPORT	W100	VISIBILITY	06km	MSL	2700
INFO		CLOUD	T.S. (1500)	MOR	6000
RUNWAY	15	TEMP.	28/25	TRANSLET	130'
ELEVATION	101	QNH	1007	GATE ON	
ZFW	16712	LDG FLAPS	40	GO AROUND	
FUEL REMAIN	1511			EPR	
L.D.W	12213	VREF	137	FLAPS	15
ARRIVAL CLEARANCES				ALTERNATE	
STAR	30LSH	VREF+5	142	AIRPORT	W101
HOLD		VREF+10	157	AIRWAYS	W101
		VREF+20		FUEL WTD	1100
SPECIAL ARRIVAL NOTES:					

Form No.: SA/02-14

Figure 11: Landing Data Card

1.18.3 Take-off and Landing Performance Limitation

Based on Boeing FCOM Revision 28 January 2011, on chapter Operating Limitation page 1.10.3, stated as follows:

- Maximum Take Off Weight : 65,090 kgs
- Maximum Landing Weight : 54,884 kgs
- Maximum Zero Fuel Weight : 51,225 kgs
- Maximum Take Off and Landing : 10 kts
- Tailwind Component

1.18.4 Operation Procedure Quoted from Boeing FCTM, Revision 30 June 2012

Approach Briefing, page 5.2

Before the start of an instrument approach, the PF should brief the PM of his intentions in conducting the approach. Both pilots should review the approach procedure. All pertinent approach information, including minimums and missed approach procedures, should be reviewed and alternate courses of action considered.

As a guide, the approach briefing should include at least the following:

- *weather and NOTAMS at destination and alternate, as applicable*
- *type of approach and the validity of the charts to be used*
- *navigation and communication frequencies to be used*
- *minimum safe sector altitudes for that airport*
- *approach procedure including courses and heading*
- *vertical profile including all minimum altitudes, crossing altitudes and*

approach minimums

- *speed restrictions*
- *determination of the Missed Approach Point (MAP) and the missed approach procedure*
- *landing distance required for current conditions compared to landing distance available*
- *other related crew actions such as tuning of radios, setting of course information, or other special requirements*
- *taxi routing to parking*
- *any appropriate information related to a non-normal procedure*
- *management of AFDS.*

ILS Approach, page 5.15

At glide slope capture, observe the flight mode annunciations for correct modes.

At this time, select landing flaps and VREF + 5 knots or VREF plus wind additive if landing manually, and do the Landing checklist. When using the auto throttle to touchdown, no additional wind additive is required to the final approach speed.

The pilot monitoring should continue recommended callouts during final approach and the pilot flying should acknowledge callouts.

Recommended Elements of a Stabilized Approach, page 5.4 – 5.5

The following recommendations are consistent with criteria developed by the Flight Safety Foundation.

All approaches should be stabilized by 1,000 feet AFE in instrument meteorological conditions (IMC) and by 500 feet AFE in visual meteorological conditions (VMC). An approach is considered stabilized when all of the following criteria are met:

- *the airplane is on the correct flight path*
- *only small changes in heading and pitch are required to maintain the correct flight path*
- *the airplane should be at approach speed. Deviations of +10 knots to – 5 knots are acceptable if the airspeed is trending toward approach speed*
- *the airplane is in the correct landing configuration*
- *sink rate is no greater than 1,000 fpm; if an approach requires a sink rate greater than 1,000 fpm, a special briefing should be conducted*
- *thrust setting is appropriate for the airplane configuration*
- *all briefings and checklists have been conducted.*

Specific types of approaches are stabilized if they also fulfill the following:

- *ILS approaches should be flown within one dot of the glide slope and localizer, or within the expanded localizer scale (as installed)*

- *during a circling approach, wings should be level on final when the airplane reaches 300 feet AFE.*

Unique approach procedures or abnormal conditions requiring a deviation from the above elements of a stabilized approach require a special briefing.

Note: An approach that becomes unstabilized below 1,000 feet AFE in IMC or below 500 feet AFE in VMC requires an immediate go-around.

1.19 Useful or Effective Investigation Techniques

The investigation was conducted in accordance with the KNKT approved Policies and Procedures Manual, and in accordance with the standards and recommended practices of Annex 13 to the Chicago Convention.

2 ANALYSIS

The analysis part of this Final Report will discuss the relevant issues resulting in the landing on taxiway involving a Boeing 737-400 aircraft registered PK-CKN at Supadio Airport of Pontianak on 19 October 2012.

The investigation determined that there were no issues with the aircraft and all systems related to this occurrence. Therefore the discussion focused on the issues of: landing distance calculation, approach preparation and hydroplaning.

2.1 Landing Distance Calculation

The condition existed during the landing that might contribute to the aircraft performance were as follows:

- The aircraft landing weight was estimated to be 119,501 lbs (54,205 kgs);
- The speed at 50 ft was 150 kts or 13 kts above the target of 137 kts;
- Wet runway and assumed medium braking action;
- Tail wind condition of 10 kts;
- Temperature 26°C;
- Auto-brake selected to position 3.

Based on the performance calculation refer to Boeing B 737 400 manual, the calculation of the required landing distance for particular condition were as follows:

Auto brake 3	= 5160 ft
Landing weight adjustment	+ 160 ft
tail wind 10 kts	+ 970 ft
slope adjustment	-
Temperature 11 above ISA	+ 130 ft
Speed 13 kts above target	+ 663 ft
Total required	= 7083 ft

The FDR recorded that the aircraft was bounced for two seconds with aircraft speed of 143 kts. The two seconds bounce would take distance approximately 144 meters or 432 ft. Therefore, the total distance required for the aircraft to stop included the consequences of two seconds bounce would be 7,515 ft while the runway length available was 7,382 ft.

The investigation concluded that the combination of the 13 kts speed higher than V_{ref} and the two seconds bounce on the runway were prolong the landing distance on that particular weather and runway condition.

2.2 Approach Preparation

During on route, the pilots received the weather information in Pontianak was rain and thunderstorm. Considered to such wet runway condition that the aircraft would require more deceleration force, the pilot changed the auto-brake selection from position 2 to position 3.

The landing data card available that was filled by the pilot showed that the Vref was 137 kts and according to the estimate landing weight of 54,205 kgs.

Based on the interview, the investigation did not find a statement explained that the pilot reviewed part of the approach crew briefing concerning the required landing distance compared to landing distance available. Whilst part of the approach briefing in the FCTM stated that the pilot should review such landing distance.

The FCOM, chapter Performance In-flight contains the landing performance calculation and was available in the cockpit. Hence, such of landing distance required can be found as for evaluation and part of awareness prior to land.

The review of landing distance required might have increased the pilot's awareness toward better flight justification to the narrow margin of the runway available for the existing weather condition.

The absence of that particular approach briefing above was most likely affected the pilot awareness on flight judgment, and resulted the approach speed was 13 kts speed higher than Vref (150 kts) when the aircraft at 50 ft, it was an indication that the aircraft was un-stabilized which requires the pilot to go around.

2.3 Hydroplaning

The observation found that on the tire number two and number three which were the inner main wheels were found reverted rubber marks (figure 3), and there was white tire marks on the runway (figure 7). The reverted rubber and white tire marks are the indication of hydroplaning.

The FDR data recorded that the longitudinal acceleration (negative value means deceleration) approximately -0.3 G on the initial landing roll and gradually reduced to approximately -0.12 G. This means there was reduction of the deceleration, even though the pilot applied maximum brake.

The descriptions above indicated that the aircraft experienced in a hydroplaning during the landing roll.

Hydroplaning occurs when a layer of water builds between the wheels and the runway surface, leading to loss of traction. The hydroplaning has reduced the brake effectiveness, hence the deceleration performance did not achieve.

Based on the observation of the runway condition during a heavy rain (figure 5) one day after the occurrence, the investigation found that several standing water areas on the runway. The worst depth was approximately 15 cm of standing water on the intersection runway and taxiway Charlie area.

The standing water on the runway would potentially lead to hydroplaning occurrence to an aircraft on landing or rejected take off.

3 CONCLUSIONS

3.1 Findings

The Komite Nasional Keselamatan Transportasi findings on the accident flight are as follows:

1. The aircraft was airworthy prior to the serious incident.
2. The crew had valid license and medical certificates.
3. The estimated landing weight was 119,501 lbs (54,205 kgs) and the target approach speed was 137 kts.
4. The weather was raining and thunderstorm, the tail wind recorded was 10 kts.
5. The aircraft speed at 50 ft was 150 kts or 13 kts above the target.
6. The aircraft was bounced on the runway for two seconds.
7. The brakes application shown 3,000 psi as the FDR recorded.
8. The calculated landing distance for that particular aircraft configuration, weather and runway condition was 7,083 ft.
9. Based on the FDR data the total distance for the aircraft to stop included the consequences of tail wind and two seconds bounce was 7,515 ft, the runway length available was 7,382 ft.
10. The aircraft stopped with the main wheels at about 2 meters from the end of stop-way runway 15 and the nose wheels sunk into the soft surface.
11. The reverted rubber were found on tire number 2 and 3 of the main wheel, and also found white mark on the runway. These marks were indication of hydroplaning.
12. The FDR recorded the longitudinal acceleration was -0.3 to -0.1 G.
13. Evaluation of the runway during raining found several standing waters on the runway up to approximately 15 cm on the intersection of taxiway Charlie.
14. Based on the interview, the investigation did not find a statement explained that the pilot reviewed the part of the approach crew briefing.
15. The part of the approach briefing in the FCTM stated that the pilot should review such landing distance.

3.2 Contributing Factors⁴

The absence of approach briefing particularly on reviewing of landing distance might have decreased the pilot's awareness toward better flight justification. This condition affected to the pilot justification which resulting the approach speed was 13 kts above Vref when the aircraft at 50 ft. And this particular condition was classified as un-stabilized approach and requires the pilot to go around.

⁴ "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 investigation report, the Komite Nasional Keselamatan Transportasi had been informed of safety actions resulting from this occurrence by the aircraft operators and Supadio Airport Authority, Pontianak.

4.1 PT Sriwijaya Air

The QSS/DS/X/2012/R-20 is a letter of Quality Safety and Security (QSS) Department describing the reminds the pilots concerning to the adverse weather operation and the Board of Instructor concerning to meet periodically to discuss all related safety included the past of accident and incident experienced in company. Detail of safety action shown on appendix 6.

4.2 Supadio Airport Authority, Pontianak

As result of The Supadio Airport Authority internal evaluation post of this occurrence issued several safety actions concerning to the improvement of the drainage system and also overlaid the runway. Detail of safety action shown on appendix 6.

5 SAFETY RECOMMENDATIONS

Based on the examination of the factual data, analysis and the relevant findings that contributed to this serious incident, it was identified that the absence of approach briefing and the excessive speed when the aircraft at 50 ft, which was classified as un-stabilized approach.

The recommendations issued are based on the findings of this investigation. However the operators and other related organization shall consider that the condition not limited to the involved flight crew or units and may possibly extends to others flight crew or similar units.

The Komite Nasional Keselamatan Transportasi issued several safety recommendations addressed to:

5.1 PT. Sriwijaya Air

- a. The absence of complete approach briefing was an indication of the inconsistency of the implementation of the operator SOP. Therefore, ensure that the pilot implements the SOP as described on the SOP.
- b. The operator has to review their current training methods in respect to the enrichment of the consistency of SOP implementation. Chapter 2 of this final report can be used as reference.

5.2 Supadio Airport Authority, Pontianak


One of the safety issues on this investigation was an indication of hydroplaning and have described on Chapter 2 of this final report. Considering to that safety issue, the Airport authority has to ensure that the amount of standing water level not exceed the limit especially when rain.

5.3 Directorate General of Civil Aviation (DGCA)

- a. To refer to the past and similar occurrences which have been recommended by the KNKT, it strongly required that the DGCA has to facilitate the recommendation described on the recommendation 5.1 and 5.2.
- b. To oversight the correct interpretation and implementation of recommendations in this report, to ensure effectiveness for safety improvement to the operators.

6 APPENDICES

6.1 The QSS/DS/X/2012/R-20 Letter

	QUALITY, SAFETY AND SECURITY RECOMMENDATION Operational Office, Jl. Pangrasan Jayakarta No.88 Blok G.15-16, Jakarta 10730, Indonesia PHONE: +62-21-639-9996 FAX: +62-21-629-8127 EMAIL: qss@sriwijayaair.co.id								
Number : QSS / DS / X / 2012 / R-20	<table border="1"><thead><tr><th colspan="2">STATUS</th></tr></thead><tbody><tr><td><input checked="" type="checkbox"/></td><td>Red</td></tr><tr><td><input type="checkbox"/></td><td>Yellow</td></tr><tr><td><input type="checkbox"/></td><td>Green</td></tr></tbody></table>	STATUS		<input checked="" type="checkbox"/>	Red	<input type="checkbox"/>	Yellow	<input type="checkbox"/>	Green
STATUS									
<input checked="" type="checkbox"/>		Red							
<input type="checkbox"/>		Yellow							
<input type="checkbox"/>		Green							
Attention : DO									
Date : 22 October 2012									
CC : BOD, POI, PMI									
Hazard level : MAJOR									
Subject : Initial Recommendation Post Incident PK-CKN at PNK									

FRIDAY, OCTOBER 19, 2012 : Aircraft PK-CKN (SJ-182) enroute CGK-PNK landed at SUPADIO International Airport on wet runway and due to raining and finally the aircraft stop at un-planning place due to overrun, nose wheel pass the end of runway 15. A few month ago a similar incident had occurred in the different results.

REFER TO THE PREVIOUS QSS RECOMMENDATION QSS/DS/VI/2012/R-06 Initial Recommendation Post Accident PK-CJV, QSS/DS/IX/2012/R-17 Low Visibility & Adverse Weather Operations (attached), and hazards information we have received, while waiting the NTSC Investigation, QSS Directorate recommends as initial safety action as follows :-

1. Operations Directorate should remind and refresh flight techniques (SOP) before conducting mission of flight regarding the Low Visibility Operations, takeoff and landing on a wet runway, ALAR, instrument approach, referring to the FCOM B-737, and others are required in wet seasons;
2. Do not impose minimum requirements for landing if the manoeuvre is not met, such as below minima, unstabilize approach and/or unable maintain safe landing, etc.
3. Disseminating information and/or to the crew briefing on the development of corporate policy and discipline of the regulations and policies of the company, also the importance of the accuracy of time and attendance (related to OTP), and the feedback filter;
4. Conducts weekly meeting for instructor periodically with related topic subjects accident-incident report, safety recommendation issues and then delivered to the line pilots parallel with Operations Safety Notice.

HOPEFULLY this QSS Recommendation can improve the company quality of safety and security products and services. **YOUR CONTRIBUTION** will give the benefit for company, customer, and we are all.

Thanks and Regards.


CAPT. TOTO SOEBANDORO
Quality, Safety and Security Director

If you feel unclear or inconvenience with this message, please do not hesitate to contact us
QUALITY-SAFETY-SECURITY STARTS WITH ME

6.2 Improvement of Runway Water Drainage System



6.3 The Overlaid Runway Surface

