

FINAL
KNKT.13.08.22.04

NATIONAL TRANSPORTATION SAFETY COMMITTEE

Aircraft Serious Incident Investigation Report

**PT. Lion Mentari Airlines (Lion Air)
Boeing 737-800; PK-LKH
Djalaluddin Airport, Gorontalo
Republic of Indonesia
6 August 2013**



NATIONAL TRANSPORTATION SAFETY COMMITTEE
MINISTRY OF TRANSPORTATION
REPUBLIC OF INDONESIA
2014

This Final Report was produced by the National Transportation Safety Committee (NTSC), 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 NTSC 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).

Readers are advised that the NTSC investigates for the sole purpose of enhancing aviation safety. Consequently, the NTSC reports are confined to matters of safety significance and may be misleading if used for any other purpose.

As the NTSC believes that safety information is of greatest value if it is passed on for the use of others, readers are encouraged to copy or reprint for further distribution, acknowledging the NTSC as the source.

When the NTSC makes recommendations as a result of its investigations or research, safety is its primary consideration.

However, the NTSC fully recognizes that the implementation of recommendations arising from its investigations will in some cases incur a cost to the industry.

Readers should note that the information in NTSC reports and recommendations is provided to promote aviation safety. In no case is it intended to imply blame or liability.

TABLE OF CONTENTS

| | |
|--|------------|
| TABLE OF CONTENTS | i |
| TABLE OF FIGURES | ii |
| ABBREVIATIONS AND DEFINITIONS | iii |
| INTRODUCTION | v |
| 1 Factual Information | 1 |
| 1.1 Personnel Information | 2 |
| 1.1.1 Pilot in Command..... | 2 |
| 1.1.2 Second in Command | 3 |
| 2 ANALYSIS | 8 |
| 2.1 Wildlife Hazard Management..... | 8 |
| 2.2 Airport fences along the Airport..... | 9 |
| 2.3 Aircraft Deceleration | 9 |
| 3 CONCLUSION | 11 |
| 3.1 Finding..... | 11 |
| 3.2 Contributing Factors | 12 |
| 4 SAFETY ACTION | 13 |
| 4.1 Djalaluddin Airport Authority | 13 |
| 4.2 Lion air..... | 13 |
| 5 SAFETY RECOMMENDATIONS | 14 |
| 5.1 Djalaluddin Airport Authority | 14 |
| 5.2 Director General of Civil Aviation | 14 |
| 5.3 Lion Mentari Airlines (Lion Air)..... | 15 |
| 6 APPENDICES | 16 |
| 6.1 The design Airport authority Safety action | 16 |
| 6.2 Safety Action PT. Lion Air..... | 19 |

TABLE OF FIGURES

| | |
|--|----|
| Figure 1. The fences condition and cow population at Djalaluddin Airport on August 2013..... | 4 |
| Figure 2. FDR data | 5 |
| Figure 3. The aircraft out of the runway..... | 6 |
| Figure 4. The aircraft wheels trapped on the shoulder | 6 |
| Figure 5. Normal Configuration landing Distances Flap 40 | 10 |

ABBREVIATIONS AND DEFINITIONS

| | | |
|-------------|---|---|
| AGL | : | Above Ground Level |
| AOC | : | Air Operator Certificate |
| ARFF | : | Airport Rescue and Fire Fighting |
| ATC | : | Air Traffic Control |
| ATIS | : | Aerodrome Terminal Information Services |
| ATPL | : | Air Transport Pilot License |
| ATS | : | Air Traffic Service |
| BMKG | : | <i>Badan Meteorologi Klimatologi dan Geofisika</i> (Metrological Climatologically and Geophysical Agency) |
| °C | : | Degrees Celsius |
| CAM | : | Cockpit Area Microphone |
| 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 of Civil Aviation |
| DMI | : | Deferred Maintenance Item |
| FDR | : | Flight Data Recorder |
| FL | : | Flight Level |
| ft | : | Feet |
| hPa | : | Hectopascals |
| Hrs | : | Hours |
| ICAO | : | International Civil Aviation Organization |
| IFR | : | Instrument Flight Rules |
| IIC | : | Investigator in Charge |
| Kg | : | Kilogram(s) |
| Km | : | Kilometer(s) |
| kts | : | Knots (nm/hours) |
| mbs | : | Millibars |
| Nm | : | Nautical mile(s) |
| NOTAM | : | Notice to Airman |
| KNKT (NTSC) | : | <i>Komite Nasional Keselamatan Transportasi</i> (National Transportation Safety Committee) |
| PF | : | Pilot Flying |
| PIC | : | Pilot in Command |
| PM | : | Pilot Monitoring |
| QFE | : | Height above airport elevation (or runway threshold elevation) based on local station pressure |

| | | |
|-------|---|---|
| QNH | : | Height above mean sea level based on local station pressure |
| SAR | : | Search and Rescue |
| S/N | : | Serial Number |
| SSCVR | : | Solid State Cockpit Voice Recorder |
| TAC | : | Temporary Airmen Certificate |
| TCAS | : | Traffic Collision Avoidance System |
| TSN | : | Time since New |
| TT/TD | : | Ambient Temperature/Dew Point |
| UTC | : | Universal Time Coordinate |
| VOR | : | Very High Frequency Omnidirectional Range |
| WOW | : | Weight on Wheel |

INTRODUCTION

SYNOPSIS

On 6 August 2013, a Boeing 737-800 aircraft registered PK-LKH, was being operated by PT. Lion Mentari Airlines (Lion Air) on a scheduled passenger flight as LNI 892. The aircraft departed from Sultan Hasanuddin Airport (WAAA) Makassar, at 1203 UTC to Djalaluddin Airport (WAMG) Gorontalo.

This previous flights were Soekarno Hatta Airport of Jakarta to Sultan Hasanudin Airport of Makassar then Djalaludin Airport of Gorontalo.

During the flight to Gorontalo the Pilot in Command (PIC) acted as the Pilot Flying (PF) and the Second in Command (SIC) as the Pilot Monitoring (PM).

There were two pilots and five flight attendants with 110 passengers on board consisted of 104 adults, 1 child and 5 infants.

The flight from Makassar till commenced the approach to Gorontalo was un-eventful and following with the weather was also clear.

At 1313 UTC, the aircraft touched down at runway 27 and during landing roll the flight crew saw some animals ahead were crossing the runway. Then when approximate 550 meters from the beginning of runway 27 and at aircraft speed approximate at 120 knots, the aircraft hit such animals.

Afterward, the pilots felt ineffective of brake respond and then the aircraft veered off to the left and trapped on the left side of the runway shoulder at about 2,100 meters from the beginning of runway 27.

The smell of burning meat entered the cabin during the landing roll and went out after the engines shut-down.

At 1314 UTC, the Djalaluddin Tower expressing a taxi clearance and it was not respond by the pilots.

At 1315 UTC, the pilot informed the Djalaluddin Tower that the aircraft was hit animals and stopped on the left runway shoulder and requested to check whether any fire on the aircraft and also requested assistance from the Airport Rescue and Fire Fighting (ARFF) to come at site

The Djalaluddin Tower confirmed that there was no fire observed.

The PIC informed the situation to the passengers and requested to remain seated and wait for further instruction. Some passengers evacuated the aircraft through right over wing emergency window without any instruction from the flight crew.

Two passengers suffer sprained muscle around the ankle, as a consequence of evacuating the aircraft through the emergency window without any instruction from the crews.

After the ARFF arrived and confirmed to the pilot that there was no fire on the aircraft.

The PIC decided to disembark the passenger via right forward and aft service doors using rescuer stairs.

Afterward found there were two dead cows were found on the aircraft main landing gears.
Damage to Aircraft

The aircraft hydraulic lines of the brake system and Weight on Wheel sensor were damaged.

Personnel Information data showed that, the entire of flight crew had valid license and medical certificate.

The aircraft was properly certified, equipped, and maintained in accordance with existing Indonesia regulations.

The weather on this serious incident was fine with the horizontal visibility at 8km.

All communications between Djalaluddin Tower and the flight crew were recorded by ground based automatic voice recording equipment and the Cockpit Voice Recorder (CVR) for the duration of the flight. The quality of the recorded transmissions was good.

The investigation concluded the contributing factors as follows:

- Some fences at the north and south of the runway along about 500 meters were broken and some parts were not installed with the fences.
- The Djalaluddin Airport has been audited as the findings: some Airport perimeter fences broken and the corrective action program did not perform. This condition it most likely that, the wildlife hazard along the runway was extremely high since the last audit.

During the investigation the Djalaluddin Airport Authority had performed safety action as mention on Chapter 4 (four), event the safety action had been performed the safety recommendations issued to prevent the similar accident occur as a mention in the Chapter 5 (five).

According to factual information and initial findings, in this final report the National Transportation Safety Committee issued several safety recommendations to the Directorate General of Civil Aviation, Djalaluddin Airport Authority and PT Lion Mentari Airlines.

1 FACTUAL INFORMATION

On 6 August 2013, a Boeing 737-800 aircraft registered PK-LKH, was being operated by PT. Lion Mentari Airlines (Lion Air) on a scheduled passenger flight as LNI 892. The aircraft departed from Sultan Hasanuddin Airport (WAAA), Makassar¹ at 1203 UTC² to Djalaluddin Airport (WAMG), Gorontalo³.

This previous flights were Soekarno Hatta airport of Jakarta to Sultan Hasanudin airport of Makassar then Djalaludin Airport of Gorontalo.

During the flight to Gorontalo the Pilot in Command (PIC) acted as the Pilot Flying (PF) and the Second in Command (SIC) as the Pilot Monitoring (PM).

There were two pilots and five flight attendants with 110 passengers on board consisted of 104 adults, 1 child and 5 infants.

The flight from Makassar till commenced the approach to Gorontalo was un-eventful and following with the weather was also clear.

At 1313 UTC, the aircraft touched down at runway 27 and during landing roll the flight crew saw some animals ahead were crossing the runway. Then when approximate 550 meters from the beginning of runway 27 and at aircraft speed approximate at 120 knots, the aircraft hit such animals.

Afterward, the pilots felt ineffective of brake respond and then the aircraft veered off to the left and trapped on the left side of the runway shoulder at about 2,100 meters from the beginning of runway 27.

The smell of burning meat entered the cabin during the landing roll and went out after the engines shut-down.

At 1314 UTC, the Djalaluddin Tower expressing a taxi clearance and it was not respond by the pilots.

At 1315 UTC, the pilot informed the Djalaluddin Tower that the aircraft was hit animals and stopped on the left runway shoulder and requested to check whether any fire on the aircraft and also requested assistance from the Airport Rescue and Fire Fighting (ARFF) to come at site

The Djalaluddin Tower confirmed that there was no fire observed.

The PIC informed the situation to the passengers and requested to remain seated and wait for further instruction. Some passengers evacuated the aircraft through right over wing emergency window without any instruction from the flight crew.

1 Sultan Hasanudin Airport of Makassar, will be named Makassar for the purpose of this report.
2 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 Tengah (WITA) is UTC + 8 hours.
3 Djalaluddin Airport (WAMG), Gorontalo will be named Gorontalo for the purpose of this report.

Two passengers suffer sprained muscle around the ankle, as a consequence of evacuating the aircraft through the emergency window without any instruction from the crews.)

After the ARFF arrived and confirmed to the pilot that there was no fire on the aircraft.

The PIC decided to disembark the passenger via right forward and aft service doors using rescuer stairs.

Afterward found there were two dead cows were found on the aircraft main landing gears. Damage to Aircraft

The aircraft hydraulic lines of the brake system and Weight on Wheel sensor were damage.

1.1 Personnel Information

1.1.1 Pilot in Command

| | | |
|-------------------------|---|---|
| Gender | : | Male |
| Age | : | 44 years old |
| Nationality | : | Indonesian |
| Date of joining company | : | 5 September 2006 |
| License | : | ATPL |
| Date of issue | : | 10 October 2005 |
| Aircraft type rating | : | Boeing 737-NG |
| Last instrument rating | : | 23 March 2013 |
| Last line check | : | 19 April 2013 |
| Last proficiency check | : | 23 March 2013 |
| Medical certificate | : | First class |
| Last of medical | : | 6 March 2013 |
| Validity | : | 6 September 2013 |
| Medical limitation | : | Holder shall possess glasses that correct for near vision |

Flying experience

| | | |
|---------------|---|-----------------------|
| Total hours | : | ± 10,000 hours |
| Total on type | : | 3,858 hours 5 minutes |
| Last 90 days | : | 271 hours 88 minutes |
| Last 30 days | : | 78 hours 83 minutes |
| Last 24 hours | : | 3 hours 83 minutes |
| This flight | : | 1 hours 30 minutes |

1.1.2 Second in Command

| | |
|-------------------------|-------------------|
| Gender | : Male |
| Age | : 32 years old |
| Nationality | : Indonesian |
| Date of joining company | : 2 January 2011 |
| License | : CPL |
| Date of issue | : 8 February 2010 |
| Aircraft type rating | : Boeing 737-NG |
| Last instrument rating | : 7 February 2013 |
| Last line check | : 25 May 2013 |
| Last proficiency check | : 7 February 2013 |
| Medical certificate | : First class |
| Last of medical | : 1 May 2013 |
| Validity | : 1 November 2013 |
| Medical limitation | : None |

Flying experience

| | |
|---------------|-------------------------|
| Total hours | : ± 1,700 hours |
| Total on type | : 1,393 hours 5 minutes |
| Last 90 days | : 236 hours 15 minutes |
| Last 30 days | : 72 hours 30 minutes |
| Last 24 hours | : 3 hours 83 minutes |
| This flight | : 1 hours 30 minutes |

The aircraft was properly certified, equipped, and maintained in accordance with existing Indonesia regulations.

The weather on this serious incident was fine with the horizontal visibility at 8 km.

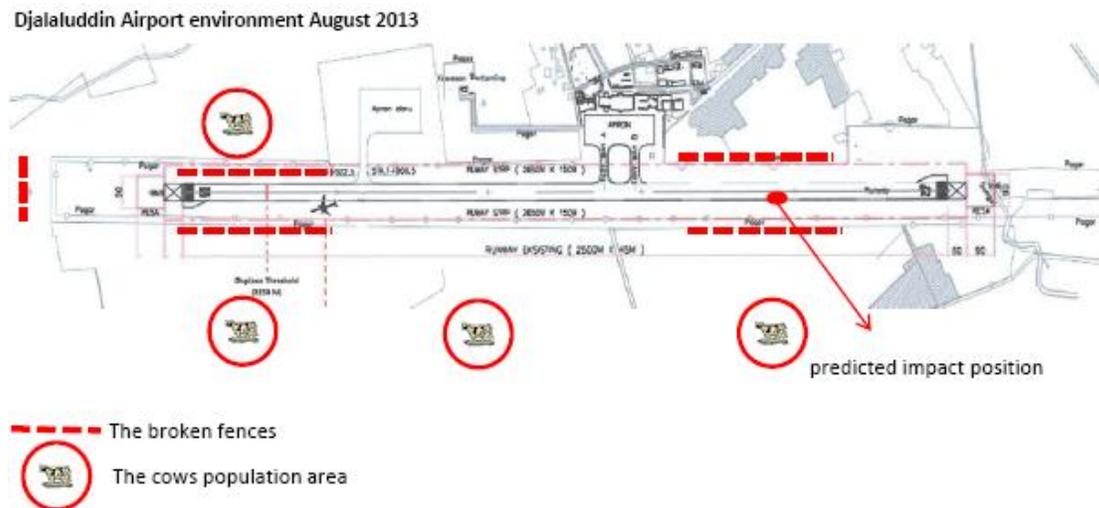
All communications between Djalaluddin Tower and the flight crew were recorded by ground based automatic voice recording equipment and the Cockpit Voice Recorder (CVR) for the duration of the flight. The quality of the recorded transmissions was good.

Airport observation;

The Djalaluddin airport certified with 043/SBU-DBU/X/2011 and located at coordinate 00°38'18"N 122°51'08"E has 2.250 meter runway length with 45 meter width.

- Some fences on the north and south of the runway about 500 meters long were broken and some parts were not installed with the fences.
- The people who living around the airport might enter the airport perimeter and while sometimes might cross the runway through the broken fences.
- Hundreds population of cows were grew and live just outside the airport perimeter, especially along the south of runway.
- The airport management has Bird and animal hazard management as stated in the Aerodrome Manual chapter 4.12.
- The audit by The Directorate of Airport dated 11 July 2013 number: 016/DBU-IK/VII/2013 found that some airport perimeter fences broken and accessible that may increase the wildlife hazard. The investigation could not find any evidence of corrective action program.

The airport layout shows the broken fences and cow's population places are shown in the figure below in the red dash lines and red circles.



Note: un-scale sketch

Figure 1. The fences condition and cow population at Djalaluddin Airport on August 2013

The FDR was received at the NTSC recorder laboratory on 12 August 2013. The details information of the FDR was:

Manufacturer : Honeywell
 Type/Model : HFR5-D
 Part Number : 980-4750-009
 Serial Number : FDR -01804

The FDR was downloaded on 12 August 2013 at the NTSC facility in Jakarta, the recorder contained over 1,200 parameters of 50 hours in excellent quality data comprising the accident flight and 28 previous flights commencing from the 8 April 2013.

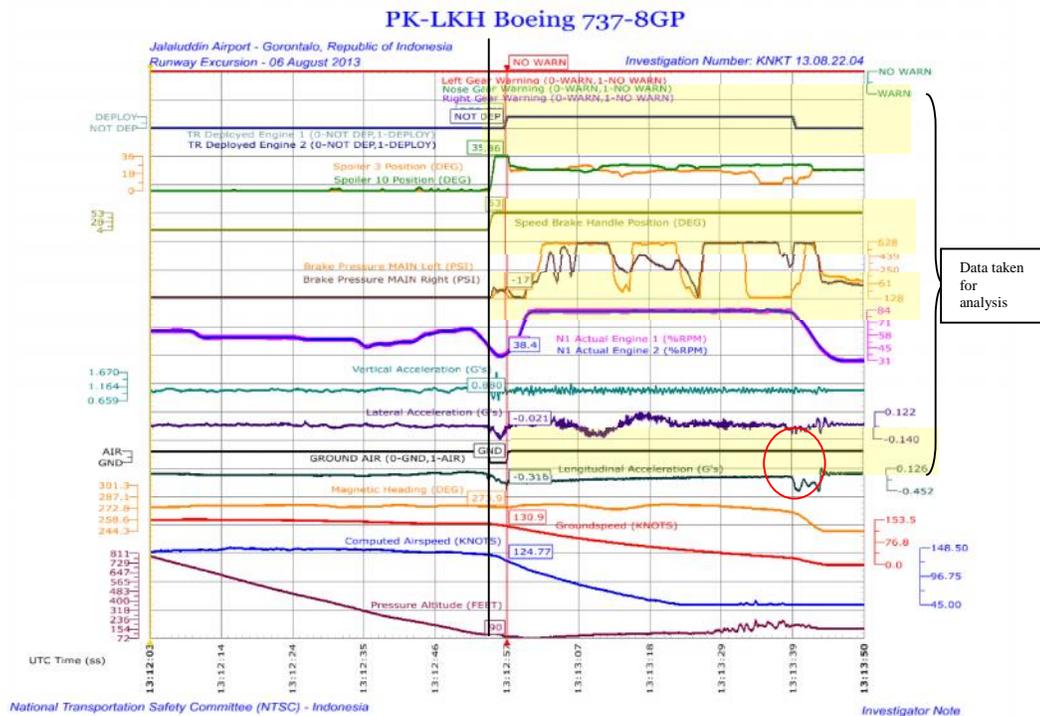


Figure 2. FDR data

The excerpts of significant data from the FDR when aircraft initial touch down on the runway are as follow;

- The spoilers, reversers were applied after touchdown.
- The longitudinal acceleration at initial aircraft touchdown was -0.316 G/sec than was gradually reduced to approximate 0.200 when stop.
- And the initial activation, the right brake pressure was indicated 439psi while the left brake was indicated 628psi.

The aircraft was equipped with a Honeywell Solid State Cockpit Voice Recorder (SSCVR) designed to record 30 minutes of audio on four channels (P/A, Co-pilot, Pilot, Cockpit Area Microphone/CAM) and 120 minutes of audio on 2 channels (combined crew audio & CAM). In this serious incident, there were no significant related conversations recorded by the CVR.



Figure 3. The aircraft out of the runway



Figure 4. The aircraft wheels trapped on the shoulder

The additional information collected during the investigation;

- Similar occurrence airport perimeter breach and resulting accident had been occurred in Mopah Airport Merauke on 28 January 2008, Budiarto Airport, Curug on 19 April 2010, and incident in Supadio Airport, Pontianak on 22 November 2012
- On 28 June 2013 lion has performed hazard identification and risk assessment for operation to Djalaluddin Airport. The hazard identified was foreign object from the broken asphalt and holes on the runway. The detail of the assessment is attached in appendix of this report.

2 ANALYSIS

The analysis part of this Final Report will discuss the relevant issues resulting from; a B737-800 aircraft Runway Incursion of PK-LKH hit the cows during the landing at Djalaluddin Airport runway 27 on 06 August 2013.

The investigation determined that there were no issues with the aircraft and all systems were operating normally prior to land.

The analysis will therefore focus on the following issues:

2.1 Wildlife Hazard Management

Refer to CASR part 139

Aerodrome certificate, a certificated issued by the DGCA under Subpart B of these regulations for operation of an aerodrome.

139.011 Grant of an Aerodrome certificate

1. DGCA must grant an aerodrome certificate to an applicant if:

- a. the aerodrome facilities, services and equipment are in accordance with the standards specified for a certified aerodrome in the manual of standard part 139- Aerodrome; and*
- b. the aerodrome operating procedure make satisfactory provision for the safety of aircraft; and*

The investigation found that The Djalaluddin Airport had been certified as a holder corticated number: 043/SBU-DBU/X/2011.

Appendix 1 Items to Be Included in An Aerodrome Manual

The aerodrome manual for a certified aerodrome is to contain at least the information referred to for each section and subsection.

4.11. Airside Vehicle Control

Particulars of procedures for the control of surfaces vehicles operating airside and or in the vicinity of the movement area, including:

- a. The applicable traffic rules (including speed limits) and the means of enforcement of the rules;*
- b. The method of instructing and testing drivers in relation to the applicable traffic rules;*
- c. The method of issuing vehicle and driver permits for airside operations;*
- d. If applicable, the means of enforcing compliance with the rules; and*
- e. The names, telephone numbers and roles of the persons responsible for airside vehicle control.*

4.12 Wildlife Hazard Management

Particulars of the procedure to deal with danger to aircraft operations caused by the presence of birds or animals on or near aerodrome, including details of the following:

- a. The arrangement for assessing any bird or animal hazard;*
- b. Implementing arrangements for the control or removal of any bird or animal hazard; and*
- c. The names and roles of the persons responsible for dealing with bird or animal hazards, and the telephone numbers for contacting them during and after working hours.*

The examination of the requirement of aerodrome certificate issuance, appendix I subject: items to be included in an aerodrome manual describing vehicle and wildlife hazard management.

In fact, on 6 August 2013 at 1313 UTC, a Boeing 737-800 aircraft registered PK-LKH, hitting the cows at approximately 550 meters from the beginning of runway 27.

2.2 Airport fences along the Airport

The Djalaluddin Airport has been audited by The Directorate of Airport dated 11 July 2013 number: 016/DBU-IK/VII/2013. As the findings: some Airport perimeter fences broken and accessible that may increase the wildlife hazard.

The investigation could not find any evidence of corrective action program following the aforesaid audit findings. This was consistent with the observation during the investigation, where some fences at the north and south of the runway about 500 meters long were broken and some parts were not installed with the fences.

Since the corrective action program did not performed, it most likely that, the wildlife hazard along the runway was extremely high since the last audit.

2.3 Aircraft Deceleration

The assumption of the Normal Configuration Landing Distance flap 40:

The aircraft actual landing weight was 56 191 Kg, and according to the calculation assuming that the Medium Reported Landing Distance was approximately 1510 meters.

The available landing distance for runway 27 was 2.250 meters, the accident aircraft was stopped at 2,100 meters on the left side on runway 27.

The FDR data had shown that:

- The spoilers, reversers were applied after touchdown.
- The longitudinal acceleration at initial aircraft touchdown was -0.316 G/sec than was gradually reduced to approximate -0.200 G/sec and stop, instead of -0.224 G/sec (AUTO BRAKE 3) it could be assumed that the aircraft hit the cows when the longitudinal acceleration -0.316 G/sec
- The initial brake pressure indications: right brake was 439 psi and left brake was 628 psi. Instead of 3000 psi refer to brakes system FCOM 737 14.10.6.
- On site data collected found that the brake lines and weight on wheel sensor were damage.

As an conclusion that the aircraft was stop at 2100 meters on the left side of the runway 27, and this deceleration as result of the activation of reversers, spoilers and the cow which stuck on the left main landing gears.

Normal Configuration landing Distances Flap 40

ADVISORY INFORMATION

Normal Configuration Landing Distances
 Flaps 40

| BRAKING CONFIGURATION | LANDING DISTANCE AND ADJUSTMENT (FT) | | | | | | | | | | | | |
|-----------------------|--------------------------------------|----------------------------------|-----------------------|---------------------|------------------|-------------------|-------------|--------------------|---------|------------------------|---------|--------|--|
| | REF DIST | WT ADJ | ALT ADJ | WIND ADJ PER 10 KTS | SLOPE ADJ PER 1% | TEMP ADJ PER 10°C | APP SPD ADJ | REVERSE THRUST ADJ | | | | | |
| | PER 65000 KG LANDING WEIGHT | PER 5000 KG ABOVE/BELOW 65000 KG | PER 1000 FT STD/HIGH* | HEAD WIND | TAIL WIND | DOWN HILL | UP HILL | ABV ISA | BLW ISA | PER 5 KTS ABOVE VREF40 | ONE REV | NO REV | |

Dry Runway

| | | | | | | | | | | | | |
|-------------|------|----------|---------|------|------|-----|------|-----|------|-----|-----|-----|
| MAX MANUAL | 2920 | 170/-160 | 60/80 | -110 | 380 | 40 | -30 | 60 | -60 | 110 | 50 | 100 |
| MAX AUTO | 3670 | 180/-200 | 80/110 | -140 | 460 | 0 | 0 | 80 | -80 | 180 | 0 | 10 |
| AUTOBRAKE 3 | 5130 | 290/-320 | 140/180 | -230 | 770 | 0 | -10 | 140 | -140 | 280 | 0 | 0 |
| AUTOBRAKE 2 | 6490 | 410/-440 | 190/250 | -310 | 1060 | 80 | -110 | 190 | -190 | 290 | 130 | 130 |
| AUTOBRAKE 1 | 7170 | 490/-510 | 230/300 | -370 | 1250 | 190 | -210 | 210 | -210 | 270 | 480 | 740 |

Good Reported Braking Action

| | | | | | | | | | | | | |
|-------------|------|----------|---------|------|------|-----|------|-----|------|-----|-----|-----|
| MAX MANUAL | 4000 | 220/-230 | 100/140 | -180 | 640 | 100 | -90 | 100 | -100 | 150 | 180 | 390 |
| MAX AUTO | 4290 | 230/-250 | 110/150 | -190 | 660 | 90 | -80 | 100 | -110 | 180 | 200 | 430 |
| AUTOBRAKE 3 | 5160 | 290/-320 | 140/180 | -230 | 780 | 30 | -20 | 140 | -140 | 290 | 10 | 40 |
| AUTOBRAKE 2 | 6490 | 410/-440 | 190/250 | -310 | 1060 | 80 | -110 | 190 | -190 | 290 | 130 | 130 |
| AUTOBRAKE 1 | 7170 | 490/-510 | 230/300 | -370 | 1250 | 190 | -210 | 210 | -210 | 270 | 480 | 740 |

Medium Reported Braking Action

| | | | | | | | | | | | | |
|-------------|------|----------|---------|------|------|-----|------|-----|------|-----|-----|------|
| MAX MANUAL | 5450 | 340/-350 | 160/220 | -290 | 1060 | 250 | -200 | 150 | -150 | 200 | 490 | 1160 |
| MAX AUTO | 6620 | 360/-370 | 170/230 | -300 | 1070 | 240 | -180 | 150 | -160 | 230 | 500 | 1170 |
| AUTOBRAKE 3 | 5770 | 360/-370 | 170/230 | -300 | 1090 | 190 | -150 | 160 | -160 | 280 | 380 | 1070 |
| AUTOBRAKE 2 | 6880 | 420/-450 | 200/270 | -340 | 1210 | 190 | -180 | 190 | -190 | 290 | 260 | 580 |
| AUTOBRAKE 1 | 7210 | 490/-510 | 230/300 | -370 | 1310 | 260 | -230 | 210 | -210 | 270 | 520 | 900 |

Poor Reported Braking Action

| | | | | | | | | | | | | |
|-------------|------|----------|---------|------|------|-----|------|-----|------|-----|------|------|
| MAX MANUAL | 7090 | 490/-500 | 240/320 | -440 | 1670 | 620 | -400 | 200 | -220 | 240 | 1060 | 2730 |
| MAX AUTO | 7110 | 490/-500 | 240/330 | -440 | 1680 | 620 | -400 | 200 | -220 | 250 | 1060 | 2730 |
| AUTOBRAKE 3 | 7180 | 500/-510 | 240/330 | -440 | 1680 | 600 | -400 | 200 | -220 | 250 | 1080 | 2760 |
| AUTOBRAKE 2 | 7540 | 520/-530 | 250/340 | -460 | 1720 | 570 | -380 | 220 | -230 | 280 | 890 | 2400 |
| AUTOBRAKE 1 | 7840 | 540/-560 | 260/350 | -470 | 1770 | 600 | -410 | 230 | -240 | 270 | 1000 | 2450 |

Reference distance is for sea level, standard day, no wind or slope, VREF40 approach speed and two engine detent reverse thrust.
 For max manual braking and manual speed brakes, increase reference landing distance by 180 ft.
 For autobrake and manual speed brakes, increase reference landing distance by 150 ft.
 Actual (manufactured) distances are shown.
 Includes distance from 50 ft above threshold (1000 ft of air distance).
 *For landing distance at or below 8000 ft pressure altitude, apply the STD adjustment. For altitudes higher than 8000 ft, first apply the STD adjustment to derive a new reference landing distance for 8000 ft then apply the HIGH adjustment to this new reference distance.

Manual courtesy of Boeing Company

Figure 5. Normal Configuration landing Distances Flap 40

3 CONCLUSION

3.1 Finding

- a. The aircraft was airworthy prior to departure and there was no any aircraft systems problem reported.
- b. All crew has valid licenses and medical certificates.
- c. During the flight the Pilot in Command (PIC) acted as the Pilot Flying (PF) and the Second in Command (SIC) as the Pilot Monitoring (PM).
- d. The flight was approach and landing in accordance with the schedule approach speed.
- e. At about 550 meter from the beginning of runway 27, at aircraft speed approximate at 120 knots, the aircraft impacted with the animals.
- f. Two dead cows were found on the aircraft main landing gears.
- g. Some fences on the north and south of the runway about 500 meters long were broken. Some part were not installed with the fences
- h. Hundreds population of cows were living outside the Airport perimeter, especially along the south of runway.
- i. The strength of the shoulder could not support when the aircraft run off the runway.
- j. The people living around the Airport, enters the Airport perimeter and sometimes cross the runway through the broken fences.
- k. The aircraft departed within the weight and balance operating limit.
- l. The Airport management has Bird and animal hazard management as stated in the Aerodrome Manual chapter 4.12 has not been implemented.
- m. The audit by The Directorate of Airport dated 11 July 2013 number: 016/DBU-IK/VII/2013 found that some Airport perimeter fences broken and accessible that may increase the wildlife hazard. The investigation could not find any evidence of corrective action program.
- n. The aircraft actual landing weight was 56 191 Kg, and according to the calculation assuming that the Medium Reported Landing Distance was approximately 1510 meters.
- o. The accident aircraft was stopped at 2,100 meters on the left side on runway 27
- p. The spoilers, reversers were applied after touchdown.
- q. The longitudinal acceleration at initial aircraft touchdown was -0.316 G/sec than was gradually reduced to approximate -0.200 G/sec and stop, instead of -0.224 G/sec (AUTO BRAKE 3).
- r. The initial brake pressure indications: right brake was 439 psi and left brake was 628 psi. Instead of 3000 psi refer to brakes system FCOM 737 14.10.6.

- s. On site data collected found that the brake lines and weight on wheel sensor were damage.
- t. This deceleration as result of the activation of reversers, spoilers and the cow which stucked on the left main landing gears.

3.2 Contributing Factors⁴

- Some fences at the north and south of the runway along about 500 meters were broken and some parts were not installed with the fences.
- The Djalaluddin Airport has been audited by The Directorate of Airport dated 11 July 2013 number: 016/DBU-IK/VII/2013, as the findings it found that: some Airport perimeter fences broken and the corrective action program did not perform. As such, This condition could be clasified as extreemly high since the findings issued till this serious incident occurred.

⁴ “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 final investigation report, the National Transportation Safety Committee had been informed of safety actions resulting from this occurrence taken by Djalaluddin Airport Authority. The safety actions are as follows (see appendices 6.1):

4.1 Djalaluddin Airport Authority

- Temporary repair of broken Airport fences.
- Planning for installation of new Airport fences in fiscal year of 2014.
- Increase the frequency security oversight from 10 to 30 times prior to takeoff and landing.
- Airport authority and local government agreed to educate local people to support the safety of aircraft operation by several methods including the installation of precaution placards.

4.2 Lion air

After the incident, SSQ lion Air has issued safety recommendation No.08/SSQ/SN/IX/2013 dated 5September 2013, subject recommendation on Serious Incident PK-LKH at Gorontalo, explaining to Lion Air airport services and operations directorate regarding mitigation steps to prevent re-occurrence of the incident.

5 SAFETY RECOMMENDATIONS

Base on the examination of the factual data and the findings that contributed to the runway incursion, there are 2 safety issues as follow;

- Some fences at the north and south of the runway approximately along 500 meters were broken and some parts were not installed with the fences.
- The Djalaluddin Airport has been audited, as the findings: some Airport perimeter fences broken and the corrective action program did not perform.

According to the aforesaid safety issues, the National Transportation Safety Committee issued several safety recommendations addressed to:

5.1 Djalaluddin Airport Authority

- The broken fence that accessible for the animal, person, vehicle to the runway is classified as an extremely hazard. If such condition exists, it is recommended to promptly correcting.
- To ensure the Aerodrome Manual especially chapter 4.12 subject: wildlife hazard management is well implemented.

5.2 Director General of Civil Aviation

CASR 139.011 Grant of an Aerodrome certificate

The DGCA must grant an aerodrome certificate to an applicant if: the aerodrome facilities, services and equipment are in accordance with the standards specified for a certified aerodrome in the manual of standard part 139-Aerodrome.

Refer to the aforesaid subpart 139.011:

- To ensure the implementation of Appendix 1 subpart 4.11 and 4.12 are implemented by the Aerodrome Certificate Holder.

As additional information similar Runway Incursion occurrence caused of broken of Airport perimeter breach and resulting accident at:

- Mopah Airport Merauke on 28 January 2008,
- Budiarto Airport, Curug on 19 April 2010, and
- Supadio Airport, Pontianak on 22 November 2012

In respect to these Runway Incursion occurrences, the oversight of the implementation such subparts should be extended to the other Airports

- Consider to the recommendations address to Djalaluddin Airport, DGCA has to make sure that the aforesaid recommendations are well implemented.

5.3 Lion Mentari Airlines (Lion Air)

To broadening hazard identification and risk assessment to ensure the safe operation of the flight.

6 APPENDICES

6.1 The design Airport authority Safety action

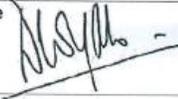






6.2 Safety Action PT. Lion Air

| | | |
|---|---|-------------------|
|  | SAFETY, SECURITY AND QUALITY DIRECTORATE | 08/SSQ/SN/IX/2013 |
| | SAFETY RECOMMENDATION | 05 09 2013 |
| | | Page 1 / 5 |

| | | |
|---|---------------------------|--|
| Date of effectiveness: | 5 September 2013 | |
| Distribution list: | DO, DA | |
| Applicability: | AO, AQ, KKGTO, OF, OFC737 | |
| Prepared by: | SFZ | Signature  |
| Verified by: | SFF | |
| Approved by: | DS | |
| Recommendations to PK-LKH Serious Incident at Gorontalo Subject: Rekomendasi atas Serious Incident PK-LKH di Gorontalo | | |



Dear Units concerned,

Kepada YTH Unit terkait,

With reference to Serious Incident of PK-LKH Veer-Off due to animal incursion in Djalaluddin airport Gorontalo 6 August 2013, SSQ has conducted investigation with these following conclusion:

Berdasarkan kejadian Serious Incident PK-LKH Veer-Off akibat *animal incursion* di bandara Djalaluddin Gorontalo tanggal 6 Agustus 2013, SSQ telah melakukan investigasi dengan kesimpulan sebagai berikut:

- a. Aircraft was airworthy at the time of the incident.
Pesawat dalam keadaan laik terbang pada saat kejadian.
- b. Weather was clear, flight was uneventful without any indication of unstabilized approach.
Cuaca cerah, penerbangan berjalan normal dan tidak ada indikasi unstabilized approach.
- c. At the beginning of landing roll, suddenly there were 3 (three) cows crossing active runway, pilot could not avoid collision due to high speed (120 knots) of the aircraft and short distance between them.
Sesaat setelah landing, secara mendadak 3 (tiga) ekor sapi melintasi active runway, pilot tidak dapat menghindari tabrakan karena pesawat masih pada kecepatan tinggi (120 knots) dan jarak pesawat ke kawanan sapi sangat dekat.
- d. Flight crew lost control of the aircraft after collision due to damage in hydraulic and brake system.
Awak pesawat kehilangan kendali pesawat setelah tabrakan karena kerusakan pada sistem hidrolik dan rem.
- e. Djalaluddin airport Gorontalo security system was not sufficient to prevent infiltration by unauthorized parties.
Sistem pengamanan bandara Djalaluddin Gorontalo tidak memadai dalam mencegah infiltrasi oleh pihak yang tidak berwenang.

Form No. : [F – SSQ – DS – 06] Rev. 01, 2013

| | | |
|---|---|---------------------------------|
|  Lion air <i>Safety, Security and Quality</i> | SAFETY, SECURITY AND QUALITY DIRECTORATE | 08/SSQ/SN/IX/2013 05 09 2013 |
| | SAFETY RECOMMENDATION | Page 2 / 5 |

As safety actions to the serious incident of PK-LKH in Gorontalo, SSQ would like to deliver recommendations as follows:

Sebagai tindakan keselamatan terhadap serious incident PK-LKH di Gorontalo, SSQ menyampaikan rekomendasi sebagai berikut:

1. Lion Airport Service (LAS): Gorontalo Station Manager

Lion Airport Service (LAS): Station Manager Gorontalo (GTOKK)

a. Ensure that communication is made with the airport authority to:

- Repair the perimeter fence and warning siren around the runway,
- Clarify the runway markings and signs.

Memastikan terlaksananya komunikasi kepada otoritas Bandara untuk:

- Memperbaiki pagar pembatas dan sirene peringatan di sekitar *runway*,
- Memperjelas garis-garis *runway markings* dan *signs*.

b. Ensure procedures are implemented by airport authority, ground staff, and AVSEC so pilots are confident that there are no obstructions/animals or persons incursion on the movement area when landing or departing.

Memastikan pelaksanaan prosedur oleh otoritas bandara, *ground staff*, dan personil AVSEC untuk meyakinkan pilot bahwa tidak ada halangan/ *incursion* hewan atau manusia pada area pergerakan pesawat saat mendarat atau saat keberangkatan.

2. Operations Directorate

Direktorat Operasi

a. Lion Air operates from and to Gorontalo on the published airport operating hours, or otherwise extended by airport authority

Lion Air beroperasi dari dan menuju Gorontalo pada jam operasi bandara yang ditentukan, atau apabila diperpanjang oleh otoritas bandara

b. Ensure procedures are implemented by pilots to gain confident that there are no obstructions/ animals or persons incursion on the movement area when landing or departing.

Memastikan pelaksanaan prosedur oleh pilot untuk meyakinkan bahwa tidak ada halangan/ *incursion* hewan atau manusia pada area pergerakan pesawat saat mendarat atau saat keberangkatan.

All of these recommendations should be implemented immediately to prevent the incident reoccurrence in the future.

Semua rekomendasi tersebut hendaknya dilaksanakan dengan segera untuk menghindari kejadian berulang.