



**KOMITE NASIONAL KESELAMATAN TRANSPORTASI
REPUBLIC OF INDONESIA**

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Aircraft Accident Investigation Report

Wings Abadi Airlines

ATR 72-212A (600 version); PK-WGK

Juanda International Airport, Surabaya

Republic of Indonesia

11 June 2014

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This Final Report was produced by the Komite Nasional Keselamatan Transportasi (KNKT), Transportation Building, 3rd Floor, Jalan Medan Merdeka Timur No. 5 Jakarta 10110, Indonesia.

The report is based upon the initial investigation carried out by the 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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Jakarta, October 2018

**KOMITE NASIONAL
KESELAMATAN TRANSPORTASI
CHAIRMAN**



SOERJANTO TIAHJONO

TABLE OF CONTENTS

TABLE OF CONTENTS	i
TABLE OF FIGURES.....	iii
ABBREVIATIONS AND DEFINITIONS.....	iv
SYNOPSIS	vi
1 FACTUAL INFORMATION	1
1.1 History of the flight.....	1
1.2 Pilot information	6
1.3 Aircraft information	6
1.4 Meteorological information	6
1.5 Aerodrome Information	7
1.6 Organization Management.....	7
1.6.1 Aerodrome Manual Juanda.....	7
1.6.2 Runway Maintenance	11
1.6.3 Safety Management System	13
1.6.4 Runway Maintenance Provider assigned by Angkasa Pura I	14
1.7 Communication.....	14
1.7.1 Flight Recorder	14
1.7.2 ATC Communication Report.....	16
1.8 RELATED REGULATION.....	18
1.8.1 Civil Aviation Safety Regulation (CASR) Part 170	18
1.8.2 Advisory Circular Number AC170-02	18
1.8.3 Manual of Standard (MOS) Part 139 Volume I; Aerodrome	19
1.8.4 ICAO Document 444 Air Traffic Management.....	22
1.9 Useful or Effective Investigation Techniques.....	22
2 ANALYSIS	23
2.1 Runway Maintenance and Inspection	23
2.2 Hazard Report	24
3 CONCLUSIONS.....	26
3.1 Findings.....	26
3.2 Contributing Factors	27

4	SAFETY ACTION.....	28
5	SAFETY RECOMMENDATIONS.....	29
5.1	PT. Angkasa Pura I Branch Office Juanda International Airport	29
5.2	Airnav Indonesia Branch Office Juanda	30
6	APPENDICES.....	31

TABLE OF FIGURES

Figure 1: Estimated location of the object on the runway	3
Figure 2: Objects found on the runway.....	3
Figure 3: Damages found on the lower fuselage.....	4
Figure 4: The hole on STA 6427	4
Figure 5: The hole on STA 15589	5
Figure 6: Aerodrome layout and the position of the reported objects	7

ABBREVIATIONS AND DEFINITIONS

AC	: Advisory Circular
AMC	: Aerodrome Movement Control
ARFF	: Airport Rescue and Fire Fighter
ATC	: Air Traffic Control
ATPL	: Airline Transport Pilot License
AVSEC	: Aviation Security
BMKG	: <i>Badan Meteorologi, Klimatologi dan Geofisika</i> (Indonesian Agency for Meteorological, Climatological and Geophysics)
C of A	: Certificate of Airworthiness
C of R	: Certificate of Registration
CASR	: Civil Aviation Safety Regulation
CVR	: Cockpit Voice Recorder
DGCA	: Directorate General of Civil Aviation
EGWPS	: Enhanced Ground Proximity Warning System
FDR	: Flight Data Recorder
FOD	: Foreign Object Damage
FWD	: Forward
ICAO	: International Civil Aviation Organization
Km	: Kilometer
KNKT	: <i>Komite Nasional Keselamatan Transportasi</i> (National Transportation Safety Committee) is the Indonesia investigation authority.
LT	: Local Time
METAR	: Meteorological Terminal Aviation Routine Weather Report
NOTAM	: Notice to Airmen
PIC	: Pilot in Command
QNH	: Indicating the atmospheric pressure adjusted to mean sea level and when this value is set on an aircraft's altimeter, will cause the altimeter to read altitude above mean sea level within a certain defined region.
SIC	: Second in Command
SOP	: Standard Operating Procedure
STA	: Station is aircraft body station represent the distance of a position along the aircraft from a reference point (datum)
TWR	: Tower (Aerodrome Control Tower)

UTC : Universal Time Coordinated
WIB : *Waktu Indonesia Barat* (Western Indonesia Time)

SYNOPSIS

The Angkasa Pura I Branch Office Surabaya as the airport operator of Juanda International Airport Surabaya (WARR) planned to perform runway maintenance that would be conducted at night after the runway operation.

On 11 June 2014, between 0100 to 0500 LT, The Angkasa Pura I Branch Office Surabaya started the runway maintenance that was performed by another company and consisted of 10 personnel and used tools including pneumatic compressor, jack hammer, chisel, high air pressure hose, asphalt mixer, small container for asphalt mixture, debris sweeper and other supporting equipment.

At 0405 LT, the Airport Rescue and Fire Fighter (ARFF) personnel performed the ARFF and the Airport Facility Readiness personnel conducted runway readiness check in conjunction with patrolling the airside used patrol car. At 0430 LT, they reported to Juanda Tower controller that the runway was clear from any hazard except the area near intersection N3 where the runway repair was still in progress. At 0450 LT, the airport maintenance team reported to Juanda Tower controller that the runway repair had finished and the runway maintenance team had left the runway. No runway inspection was performed after the runway repair finished.

At 0500 LT, the airport operation initiated. Between 0500 LT and 0606 LT, 11 aircraft departure and one arrival, no pilot reported the foreign object on the runway. The first pilot report of objects was near the intersection taxiway N5 and was made at 0609 LT which was after sunrise at 0559 LT. This indicated that the objects were not clearly visible during dark time.

At 0615 LT, the controller contacted the Airport Facility Readiness personnel but no reply, thereafter the controller contacted the ARFF personnel informed the pilot report of object on the runway and requested to check the existence of the reported object. When the ARFF vehicle arrived near the runway the controller instructed to wait for three aircraft that were about to land.

At 0620 LT, an ATR 72-212A (600 version) registered PK-WGK with flight number IW1861 landed and impacted chisel, resulted in eight holes on the aircraft lower fuselage.

At 0623 LT, the controller decided to close the runway operation and instructed the ARFF personnel to enter and inspect the runway. The ARFF personnel found compressor hose (about 10 meters long), jack hammer (about 60 cm long) and chisel (about 4.5 kg) on the runway.

The investigation concluded the contributing factors to this accident were:

- The runway inspection that was performed while the runway maintenance has not been finished resulted in the object which were on dark colour and found on dark surface did not properly inspect, and
- The insufficient information regarding the objects and the location might have made improper assessment to the consequences of the runway operation and delaying the object removal.

Following the investigation, KNKT issues safety recommendations to PT. Angkasa Pura I Branch Office Juanda International Airport, Airnav Indonesia Branch Office Juanda.

1 FACTUAL INFORMATION

1.1 History of the flight

The Angkasa Pura I Branch Office Surabaya as the airport operator of Juanda International Airport Surabaya¹ (WARR) planned to perform runway maintenance that would be conducted at night after the runway operation. The NOTAM² that was published with reference number A0888/14 stated that from 2 May 2014 until 26 June 2014 the runway 10/28 would be closed daily from 1800 – 2159 UTC³ (0100 – 0459 local time) due to work in progress.

On 11 June 2014, at 0100 LT, the Airport Facility Readiness team started the runway maintenance program for that day. The maintenance included patching the runway surface. The runway maintenance was performed by another company and consisted of 10 personnel. The tools used for this runway maintenance included pneumatic compressor, jack hammer, chisel, high air pressure hose, asphalt mixer, small container for asphalt mixture, debris sweeper and other supporting equipment. Along with the personnel and tool, there were four vehicles to support the maintenance team.

The Airport Facility Readiness team planned to repair seven locations on the runway among 11 reported damages. The runway maintenance task started from the damage spot near the beginning of runway 10 and continued until the seventh damage location near the intersection taxiway N3.

At 0405 LT, as normal daily activity, the Airport Rescue and Fire Fighter (ARFF) personnel performed the ARFF vehicles check including engine warmed up and serviceability by driving along the runway. While driving along the runway, the ARFF personnel also conducted the runway inspection.

At about the same time as ARFF, the Airport Facility Readiness personnel conducted runway readiness check in conjunction with patrolling the airside used patrol car.

At 0430 LT, the airport maintenance team reported to Juanda Tower controller that the runway was clear from any hazard except the area near intersection N3 where the runway repair was still in progress. At 0435 LT, the ARFF personnel informed the Juanda Tower controller of similar information.

At 0450 LT, the airport maintenance team reported to Juanda Tower controller that the runway repair had finished and the runway maintenance team had left the runway.

At 0500 LT, the airport operation initiated. At 0508 LT, the first aircraft (Airbus A320) landed from Jakarta.

¹ Juanda International Airport Surabaya will be named as Juanda for the purpose of this report.

² NOTAM (Notification to airmen) is the publish notification to inform all related personnel to the current condition of an aerodrome.

³ 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 that be used in this report is *Waktu Indonesia Barat (WIB)* or Western Indonesia Standard Time which is UTC +7 hours.

Between 0517 LT until 0606 LT, 11 aircraft departed from runway 10 and there was no pilot report regarding to the object on the runway. At 0520 LT, the sweeper vehicle driver requested to controller to cross the runway and no report of object on runway.

At 0609 LT, a Boeing B737-900ER landed and the pilot reported several objects looked like cable and drilling equipment at the intersection taxiway N5 and was acknowledged by the ATC controller. This was the first pilot report of object.

At 0615 LT, the controller contacted the Airport Facility Readiness personnel used handy talky radio but no reply, thereafter the controller contacted the ARFF personnel informed the pilot report of object on the runway and requested the ARFF personnel to check the existence of the reported object. The ARFF personnel acknowledged and deployed one vehicle to inspect the runway. When the ARFF vehicle arrived near the runway and the ARFF personnel requested clearance to enter the runway and the controller instructed to wait for three aircraft that were about to land.

Between 0613 LT to 0615 LT, two aircraft departed and no pilot report regarding the object on the runway.

At 0618 LT, a Boeing B737-900ER landed and reported to the controller that the objects were on the centerline of the runway just before exit taxiway N5 consisted of drilling equipment with long cable.

At 0619 LT, an Airbus A320 departed and the pilot did not report regarding the object on the runway.

An ATR 72-212A (600 version) aircraft, registered PK-WGK (the aircraft), was being operated by PT. Wings Abadi Airlines (Wings Air) on scheduled passenger flight, from Lombok International Airport (WADL) Lombok, to Juanda with flight number IW 1861. Total person on board was 59 persons, consisted of two pilots, two flight attendants and 55 passengers.

At 0620 LT, the IW 1861 landed on runway 10 at Juanda International Airport and instructed by Juanda Tower controller to exit via taxiway N5 then proceed to parking stand 22 on the apron. During landing roll, the flight crew heard impact noises and no abnormal indication on the cockpit instruments. Afterward the pilot informed to the Juanda Tower controller that they saw drilling equipment and cable near the runway center line. The pilot decided to continue taxi as instructed.

At 0622 LT, a CRJ 1000 landed and the pilot reported objects of big pieces of metal on the runway center line near the taxiway N5.

At 0623 LT, a Boeing B737-800NG landed, afterward the controller decided to close the runway operation by holding all departure and arrival aircraft to check the reported object on the runway. The controller instructed the ARFF personnel to enter and inspect the runway. The ARFF personnel found compressor hose (about 10 meters long), jack hammer (about 60 cm long) and chisel (about 4.5 kg) on the runway.

The estimated location of the compressor hose, chisel and jack hammer on the runway is shown in the figure below.



Figure 1: Estimated location of the objects on the runway

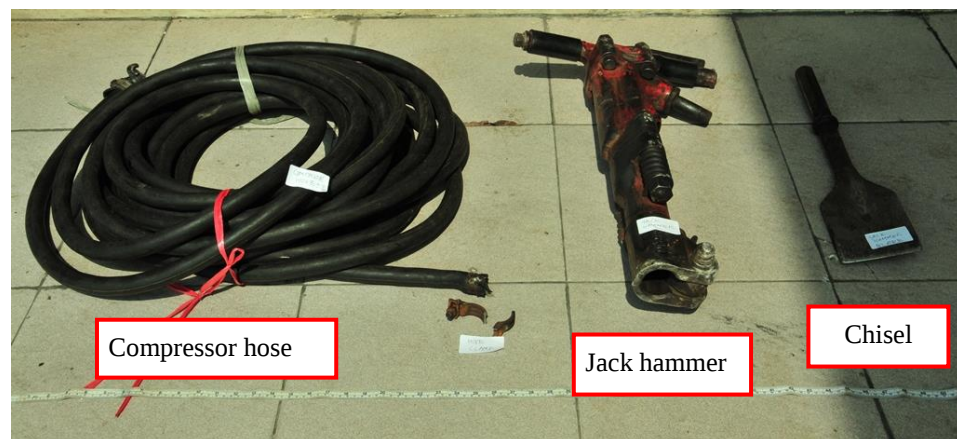


Figure 2: Objects found on the runway

1.2 Damage to aircraft

After the IW 1861 aircraft parked on the apron, the aircraft engineer performed walk around inspection and found eight holes at the aircraft lower fuselage between the nose wheel and the main wheel bay. The aircraft grounded for further inspection and repair. No one injured in this accident.

The damages found on the aircraft are shown below.



Figure 3: Damages found on the lower fuselage



Figure 4: The hole on STA 6427

The identification of the damages to the aircraft was as follows:

1. at body station (STA)⁴ 6427, a hole with dimension of 33 cm x 15 cm,
2. at STA 6888, a hole with dimension of 44 cm x 19 cm,
3. at STA 7684, a hole with dimension of 29 cm x 15 cm,
4. at STA 9020, a hole with dimension of 49 cm x 15 cm,
5. at STA 10604, a hole with dimension of 53 cm x 22 cm,
6. at STA 12268, a hole with dimension of 26 cm x 14 cm, honeycomb panel and gondola support structure damage,
7. at STA 13322, a hole with dimension of 30 cm x 40 cm, honeycomb panel, gondola support structure, refrigeration condenser and pipe damage,
8. at STA 15589, a hole with dimension of 34 cm x 50 cm, honeycomb panel and wheel well structure damage.



Figure 5: The hole on STA 15589

4 Station (STA) is the distance of a position along the aircraft from a reference point (datum).

1.3 Pilot information

The PIC was 25 years old, Airline Transport Pilot License (ATPL) holder and Indonesia nationality pilot. The pilot had flying experience with total of 3,506 hours on type. The PIC had the current first class medical license.

The SIC was 26 years old, ATPL and holder Indonesia nationality pilot. The pilot had flying experience with total of 2,221 hours on type. The SIC had the current first class medical license.

1.4 Aircraft information

The aircraft was ATR 72-212A (600 version) aircraft registration PK-WGK with serial number 1106 had the valid Certificate of Airworthiness (C of A) and Certificate of Registration (C of R). The total hours since new of the aircraft was 1,642 hours and the total cycle since new was 1,825 cycles.

The aircraft installed with two engines manufactured by Pratt and Whitney Canada Corp (P&WC) type PW127M. The left engine had serial number PCE-ED0596 with the total time since new of 5,601 hours and total cycle since new was 6428 cycles. The right engine serial number was PCE-ED0597 with the total time since new was 5,601 hours and total cycle since new was 6,428 cycles.

The aircraft equipped with L-3 Communication Model 2100 Flight Data Recorder (FDR) and Cockpit Voice Recorder (CVR). The part number of FDR was 2100-4045-00 serial number 879347 and the part number CVR was 2100-1020-02 serial number 874040. Both recorders were taken from the aircraft and transported to KNKT recorder facility. Both recorders were downloaded successfully.

The investigation considers that the FDR did not contain relevant information to be included in this report.

The CVR contained the pilot conversation during the occurrence. The excerpt of relevant information in the CVR described in chapter 1.4 Communication.

1.5 Meteorological information

The weather reported by Indonesian Agency for Meteorological, Climatological and Geophysics (*Badan Meteorologi, Klimatologi dan Geofisika* – BMKG) during the aircraft landing was visibility 2 km, surface wind calm, temperature was 26° C and QNH⁵ was 1007 mbar. According to the METAR⁶, at 2230 UTC, the visibility was 2 km hazy and at 2300 UTC the visibility was 1.8 km hazy. The sunrise was at 2259 UTC and sunset at 1045 UTC.

⁵ QNH indicating the atmospheric pressure adjusted to mean sea level and when this value is set on an aircraft's altimeter, will cause the altimeter to read altitude above mean sea level within a certain defined region.

⁶ METAR is a format for reporting weather information. A METAR weather report is predominantly used by pilots in fulfillment of a part of a pre-flight weather briefing. METAR is also known as Meteorological Terminal Aviation Routine Weather Report.

1.6 Aerodrome Information

The aerodrome information as follows:

Aerodrome Code	: WARR / SUB
Airport Name	: Juanda International Airport
Airport Address	: Jl. Ir. H. Juanda Utara Bandara Juanda Surabaya Indonesia 61253
Aerodrome operator	: Angkasa Pura I Branch Office Juanda International Airport
Aerodrome operating hours	: 2300 until 1700 UTC
Coordinates	: 07°22' 51" S, 112° 47' 11" E
Elevation	: 9 feet
Runway Length	: 3,000 meters
Runway Width	: 45 meters
Azimuth	: 10 – 28
Runway Surface	: Asphalt concrete 94/F/D/X/T

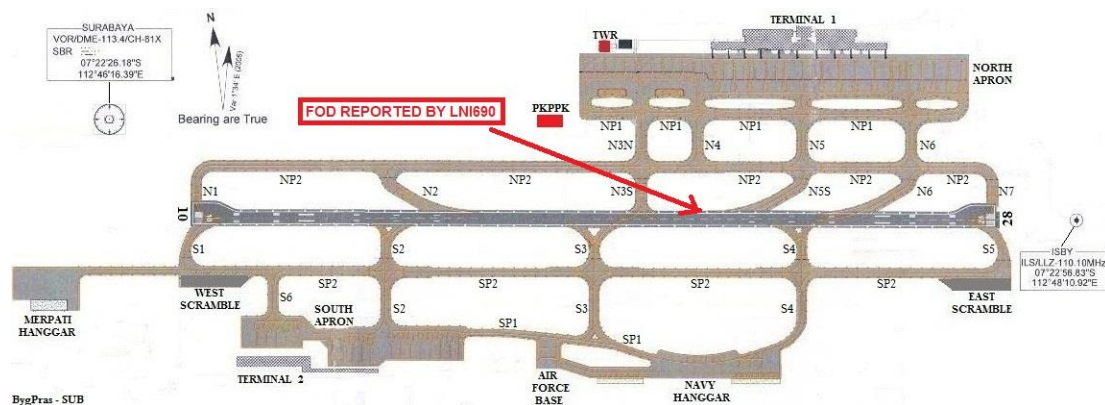


Figure 3: Aerodrome layout and the position of the reported objects

1.7 Organization Management

1.7.1 Aerodrome Manual Juanda

The Aerodrome Manual Juanda contained the operational procedure of Angkasa Pura I (AP I). The manual was written in Bahasa Indonesia and did not contain identification number and revision number. The relevant parts of the manual will be translated in English for the purpose of this report.

The relevant parts of the Aerodrome Manual Surabaya are listed as follow:

Bagian 1.3 Kondisi Penggunaan Bandar Udara Juanda <i>Bandar Udara Juanda beroperasi selama 18 jam setiap hari, mulai dari jam 06.00 WIB sampai dengan jam 24.00 WIB atau 23.00 - 17.00 UTC untuk mendukung operasi lepas landas dan pendaratan pesawat udara, seluruh operator pesawat yang beroperasi di Bandar Udara Juanda akan mengikuti dan menyesuaikan dengan jam operasi tersebut.</i>	Chapter 1.3 Operational Condition Juanda Airport Juanda airport operates 18 hours daily, between 06.00 LT (23.00 UTC) until 24.00 LT (17.00 UTC) to support takeoff and landing, all aircraft operator operates in Juanda Airport shall follows and adjust the aircraft operation.
Bagian 4.5 Pemeriksaan di Daerah Pergerakan dan Wilayah OLS <i>4.5.1 Tanggung jawab</i> <i>Tujuan dari prosedur ini adalah untuk memastikan bahwa daerah pergerakan, fasilitas terkait dan batas ketinggian rintangan (OLS) diperiksa secara rutin sehingga memenuhi ketentuan Direktorat Jenderal Perhubungan Udara.</i> <i>4.5.4 Pemeriksaan Daerah Pergerakan dan Obstacle Limitation Surface</i> <i>a) Prosedur dan Frekuensi Inspeksi serviceability dilakukan oleh teknisi yang bersangkutan sebagai berikut:</i> <i>1) Inspeksi rutin pada daerah pergerakan dan obstacle Limitation Surface dilakukan Dua kali yaitu pada pukul 05.00 pagi dan pukul 14.00 atau menyesuaikan dengan waktu yang telah diberikan oleh Tower.</i>	Chapter 4.5 Inspection of the Movement Area and OLS (Obstacle Limitation Surface) 4.5.1 Responsibility The objective of this procedure is to ensure the movement area, related facility and obstacle limitation surface (OLS) are periodically inspected to ensure the compliance to the DGCA requirement. 4.5.4 Inspection of Movement Area and Obstacle Limitation Surface a) Procedure and frequency of inspection for serviceability conducted by technician as follows: 1) Routine inspection at movement area and obstacle limitation surface is conducted twice at 05.00 in the morning and 14.00 or at the time provided by the Tower
Bagian 4.7 Pemeliharaan Daerah Pergerakan Pesawat Udara <i>4.7.2 Tanggung Jawab</i> <i>a) General Manager memiliki tanggung jawab penuh untuk penyediaan fasilitas di daerah pergerakan Bandar</i>	Chapter 4.7 Maintenance of the Movement Area 4.7.2 Responsibility a) General Manager is responsible to ensure the availability of the facility in the aircraft movement area

udara. b) <i>Airport Operation & Readiness dept. Head bertanggung jawab untuk memastikan bahwa perawatan dan inspeksi teknis fasilitas movement area Bandar udara dilakukan dan dicatat sesuai dengan standar dan persyaratan dari manual ini.</i> c) <i>Airport Facilities Readiness Sect. Head bertanggung jawab untuk memastikan bahwa petugas melaksanakan dan mencatat inspeksi serviceability harian daerah pergerakan di Bandar udara dan memastikan bahwa petugas mengetahui keselamatan kerja di daerah pergerakan.</i> d) <i>Airport Facilities Readiness Sect. Head bertanggung jawab untuk memastikan marka dan alat bantu visual sesuai dengan standar.</i>	b) The Head of Airport Facility Readiness is responsible to ensure the maintenance and inspection movement of the area is performed and recorded according to the standard and requirement of this manual c) The Head of Airport Facility Readiness Section is responsible to ensure the inspection movement area is performed and recorded and make sure that the officer knows the safety in the movement area. d) The Head of Airport Facility Readiness Section is responsible to ensure the marking and visual aid meets the standard.
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Investigation note:

ICAO Annex 14 Aerodrome Design and Operation in chapter 1 Definition, stated the definition of movement area is part of an aerodrome to be used for the take-off, landing and taxiing of aircraft, consisting of the taxiway, runway and the apron(s).

The inspection and refinement of movement area is mentioned in Aerodrome Manual chapter 4.7 in the sub chapter 4.7.4. The statement is as follow:

<i>4.7.4 Standar Operasional Prosedur</i> <i>Standar Operasional Prosedur untuk memelihara movement area ditangani oleh Airport Operation & Readiness Department dan disetujui oleh General Manager. Prosedur ini terdiri dari SOP berikut:</i> c) <i>Pemeriksaan Runway, Taxiway, dan Apron</i> 1) <i>Inspeksi daerah pergerakan dilakukan dua kali sehari oleh Teknisi Senior Airport Facilities Readiness Sect. Head.</i> 2) <i>Unit lain seperti petugas Fire</i>	Chapter 4.7.4 Standard Operating Procedure The standard operating procedure of movement area maintenance is handled by the Airport Operation & Readiness Department and approved by the General Manager. The procedure consists of the following SOP: c) Inspection of Runway, Taxiway and Apron 1) The inspection of movement area performed twice a day by the senior technician of Airport Facilities Readiness section
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<i>Fighting & Rescue, AMC, AVSEC, ADC akan memeriksa daerah pergerakan dan akan berkoordinasi dengan teknisi senior apabila terdapat temuan apapun yang dapat mempengaruhi keselamatan penerbangan.</i> d) <i>Pembersihan Permukaan Runway, Taxiway dan Apron</i> 1) <i>Pembersihan permukaan daerah pergerakan dilakukan oleh Runway Sweeper setiap hari dan bila diperlukan.</i> 2) <i>Pembersihan permukaan rutin dilaksanakan sekali sebulan secara manual maupun oleh Runway Sweeper.</i> 3) <i>FOD dibersihkan secara manual, sedangkan tanah, rumput, tumpahan minyak dibersihkan oleh penyapu bermotor dilakukan oleh Petugas Airport Facilities Readiness Section atau bila membutuhkan banyak air dibantu oleh Petugas Fire Fighting & Rescue menggunakan water tender untuk membersihkan tumpahan minyak yang luas.</i>	2) The other units such as Fire Fighting & Rescue, AMC (Apron Movement Control), AVSEC (Aviation Security), ADC (Aerodrome Control) officer shall inspects the movement area and coordinates with the senior technician for any finding which may affects the flight safety. d) Cleaning of Runway, Taxiway and Apron surface 1) Cleaning the surface of the movement area conducted by runway sweeper daily and when consider necessary 2) Routine cleaning of movement area is performed monthly either manually or using the Runway Sweeper. 3) FOD (Foreign Object Debris) will be removed manually, while dirt, grass, oil spill will be cleaned by motorized sweeper operated by Airport Facilities Readiness officer, or if require significant number of water may be assisted by the Airport Rescue and Fire Fighter using water tender to clean large area of oil spillage.
4.7.5 Maintenance Level a) <i>Tingkat I: Ini adalah pemeliharaan preventif secara periodic tiga kali sehari meliputi pembersihan, inspeksi marka dan struktur trotoar yang dilakukan oleh teknisi, seperti:</i> 1) <i>Dua kali sehari dibersihkan dengan traktor pemotong dan secara manual dan mengawasi movement area meliputi drainase</i> 2) <i>Setiap saat apabila terdapat FOD</i>	Chapter 4.7.5 Maintenance Level a) Level I: is a periodic preventive maintenance that performs three times a day consisted of cleaning, runway marking inspection and shoulder structure which is performed by the technician, including: 1) Twice a day cleaning by use cutting tractor or manually and observing the movement area including the drainage 2) At any time when FOD is known.

b) <i>Tingkat II: Pemeliharaan dilakukan bila dibutuhkan, ini adalah pemeliharaan korektif yang meliputi reconditions dan pengecatan kembali permukaan trotoar yang rusak ringan, misalnya karena rubber deposit, seperti:</i> 1) <i>Membersihkan rubber deposit di landasan dan taxiway, sekali dalam setiap 3 bulan.</i> 2) <i>Mengecat kembali marking line pada runway, taxiway dan apron per 3 bulan atau sesuai kebutuhan.</i> c) <i>Tingkat III: Diklasifikasikan sebagai perbaikan dan akan dilakukan bila terjadi malfunction yang tidak dapat diperbaiki oleh Pemeliharaan Tingkat II. Perawatan dilakukan dengan khusus, seperti:</i> 1) <i>Tes friction runway dilakukan tahunan oleh penguji khusus.</i> 2) <i>Jika hasil tes menunjukkan perlu perbaikan, maka overlay akan dilakukan.</i> 3) <i>Pengukuran kedalaman air tidak pernah dilakukan dengan alat khusus tetapi diukur secara manual dengan penglihatan.</i>	b) Level II: Maintenance that is performed when required, which is the maintenance repair consisted of reconditions and repainting of minor damage on the runway shoulder, such as rubber deposit, including: 1) Rubber deposit cleaning on runway and taxiway, every three months 2) Repainting the marking line of the runway, taxiway and apron every three months or when consider necessary c) Level III; is classified as repair which and will be conducted when damage cannot be performed on maintenance level II. Special maintenance conducted such as: 1) Runway friction test, performed annually by special personnel 2) If the test result indicates repair is required, then it overlay may be performed 3) Water level measurement is not performed by special equipment and will be performed visually.
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1.7.2 Runway Maintenance

According to the Aerodrome Manual Surabaya, the runway maintenance is the responsibility of the Airport Readiness and Operation Department. The inspection of the runway readiness was performed twice a day by a senior engineer of Airport Facility Readiness section under the Airport Readiness and Operation Department. The inspection method mainly performed by visual inspection.

The result of the runway inspection that was reported refers to the “Form Checklist *Piket Rutin Landasan*” (Routine Runway Duty checklist form). The inspection performed on 10 June 2014 found 11 damages on the runway which were:

- Six holes on area of touchdown up to 350 meters from the beginning of runway 10

- One hole on area of touchdown approximately 600 meters from the beginning of runway 10
- Four holes on intersection of exit taxiway N3

Considering the time availability, the airport maintenance team planned to repair seven locations on the runway among 11 reported damages. The runway repair started from the damage spot near the beginning of runway 10 and continued until the seventh damage spot near the intersection taxiway N3.

At 1800 UTC on 10 June 2014 (0100 LT on 11 June 2014), the airport maintenance team started the runway maintenance program. The maintenance included patching the runway surface. The runway maintenance involving 10 personnel consist of two personnel from the Airport Readiness and Operation Department and eight personnel of out-source company that assigned by the Juanda International Airport management under contractual agreement.

The investigation did not find any checklist to conduct the runway maintenance including the checklist or method to control the tool and equipment completeness before and after the runway maintenance.

Inspection by ARFF Personnel

Prior to the runway operation, the ARFF personnel usually conduct vehicle check including engine warming up and serviceability by driving along the runway. During serviceability check, the ARFF personnel on duty also conducts runway inspection however, this routine activity is not mentioned in the procedure. The ARFF personnel have not been trained for runway inspection.

At 2100 UTC on 10 June 2014 (0400 LT on 11 June 2014 LT), ARFF personnel conducted vehicle check including engine warming up and serviceability by driving along the runway from the beginning to end of runway 10. When arrived near taxiway S3, the ARFF personnel noticed that the runway maintenance team was conducting the runway patching repair. Subsequently, the ARFF personnel continued driving the vehicle until the end of runway 10 and then entered to the apron until the end of apron area. The ARFF vehicle then returned to the ARFF station.

1.7.3 Safety Management System

The Angkasa Pura I airport has been implemented safety management system. The hazard identification was included in the manual as shown below.

4.1 Identifikasi Hazard/Risiko <i>Setiap pegawai bertanggung jawab untuk melakukan identifikasi hazard dan melaporkan kepada Safety Management System, Quality Management & Customer Service Department. Format pelaporan hazard dapat dilihat pada Apendik D dan hazard checklist pada Apendik F. Identifikasi hazard dan pelaporan ini adalah untuk melihat apakah ada penyebab kemungkinan hazard yang terjadi di setiap prosedur operasional bandar udara. Para pegawai yang terkait dengan operasional diberikan pelatihan identifikasi hazard dan tata cara pelaporannya.</i> <i>Identifikasi hazard yang ada di Bandar Udara Juanda dilakukan berdasarkan:</i> • <i>Pelaporan, sesuai dengan tata cara pelaporan pada Bab V;</i> • <i>Inspeksi gabungan, minimum dilakukan 1 tahun sekali atau sesuai dengan kebutuhan;</i> • <i>Audit, minimum dilakukan 1 tahun sekali atau sesuai dengan kebutuhan.</i>	4.1 Identification of Hazard / Risk All employees are responsible to identify the hazard and report to Safety Management System, Quality Management & Customer Service Department. Report format is available in the Appendix D and the hazard checklist is available in Appendix F. This hazard identification and reporting is to identify any possible hazards that may occurs in operational procedure in the airport. Employees associated with operations are provided with training of hazard identification and reporting procedures. The hazard identification at Juanda Airport is conducted based on: • Reporting, in accordance with reporting procedures in Chapter V; • Joint inspection, conducted minimum once a year or as required; • Audit, conducted minimum once a year or as required.
4.2 Proses Manajemen Risiko <i>Safety Management System, Quality Management & Customer Service Department Head bertanggung jawab untuk melakukan penilaian lingkungan kerja dalam rangka identifikasi hazard yang ada maupun yang secara potensial bisa menjadi hazard.</i> <i>Analisa risiko merupakan proses</i>	4.2 Risk Management Process Safety Management System, Quality Management & Customer Service Department Head are responsible for assessing the working environment in order to identify existing hazards including any condition that may become hazard. Risk analysis is the process of

<i>melakukan perkiraan probabilitas dan konsekuensi dari tiap-tiap hazard sehingga semua risiko dipahami dan dibuat skala prioritas.</i> <i>Proses manajemen risiko dapat dilihat secara lengkap seperti pada Apendik F, G, dan H.</i>	estimating the probabilities and consequences of every hazard so that all risks are understandable and can be prioritized. The risk management process is described in the Appendix F, G, and H.
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Investigation did not find the hazard identification and risk assessment for runway maintenance program including using out-source personnel in the airside.

1.7.4 Runway Maintenance Provider assigned by Angkasa Pura I

Juanda International Airport management assigned other company to conduct the runway maintenance under a contractual agreement. Investigation did not find the procedure and specification requirement to assign a company for runway maintenance. The runway maintenance process was supervised by the Airport Readiness and Operation Department personnel.

Investigation revealed that the runway maintenance was conducted by assigned company that employed mostly construction workers who did not have qualification and experience of performing task on airside.

1.8 Communication

The communication on the Juanda Tower frequency was recorded on the automatic ground base recording facility. The facility recorded communication several pilots and the controller. Some parts of the communication on the Juanda Tower frequency also recorded in the aircraft CVR, including the pilot conversation and noise that could be heard from the cockpit. The excerpts of these recordings are described in the following sub-chapters.

1.8.1 Flight Recorder

The CVR consist of relevant information during the occurrence. The excerpt of the communication between the pilot and ATC controller is shown below.

Time (LT)	From	To	Excerpt Conversation
06:11:38			The conversation between ATC controller and other aircraft that reported there were several foreign objects on the runway. The location of the foreign objects was just before the intersection taxiway N5.
06:15:52	P1	TWR	Reported that Wing 1861 established on the localizer.
06:16:14	TWR	Wing	Instructed to continue approach to runway 10 and to report when passing outer

Time (LT)	From	To	Excerpt Conversation
		1861	marker.
06:17:00			Sound of landing gear extended.
06:17:02– 06:17:38			The conversation between controller and another pilot regarding the foreign object on the runway was drilling equipment.
06:18:15	P1	P2	P1 said that cable and drill were reported on the runway.
06:18:39	P1	TWR	Reported that the aircraft had passed the outer marker and the controller issued landing clearance.
06:19:03	P1	P2	Wondering whether the object can be seen from the runway.
06:19:45	P1	TWR	The pilot mentioned the runway was insight.
06:20:14 – 06:20:19	EGPWS		Altitude call out counting down the aircraft altitude from fifty to ten feet.
06:20:27			Sound of aircraft touched down
06:20:36	P1		Mentioning the speed of 80 and then 70 knots.
06:20:39	P1		The PIC took over the aircraft control.
06:20:41	P1		The PIC stated to continue rolling on the runway.
06:20:47	P2		Oh.. it is true
06:20:48	TWR		Provide landing time and instructed the pilot to exit via taxiway N5 and contact to Ground controller
06:20:51.120	(one of the pilot)		Ah...
06:20:52.475			Sound of first impact. Note: The ground speed recorded on the FDR at this time was 40 knots.
06:20:52.523			Sound of second impact.
06:20:52.647			Sound of third impact.
06:20:52.748			Sound of 4 th impact.
06:20:53.019			Sound of 5 th impact.
06:20:53.397			Sound of the pilot exclaimed.

Time (LT)	From	To	Excerpt Conversation
06:20:53.432			Sound of 6 th impact.
06:21:01	P2	TWR	Reported to controller there were foreign objects consisted of drill tolls and rope and was acknowledged by the controller
06:22:21	P1	P2	Performed the after-landing checklist.
06:26:27			Passenger started to disembark
07:02:06			End of recording

1.8.2 ATC Communication Report

The excerpt of communication as reported by the controller combined with the communication on Juanda Tower frequency as recorded on the automatic ground base recording facility are summarized as follow.

Time (LT)	Excerpt communication
0508	A320 aircraft landed
0520	A sweeper driver requested clearance to cross the runway
0527 - 0606	11 aircraft departure
0609	B 737 NG landed and the pilot informed the tower controller that there were objects on the runway something which looked like a cable with drill. The tower controller asked the exact position of the objects. The pilot mentioned the position of the objects were about taxiway N5. Tower controller confirmed that the objects were about at the taxiway N5 The pilot reconfirmed the controller that the objects were about the center of the runway and mentioned that the object was a drill. The controller reconfirmed the foreign objects. The pilot repeating that the foreign object was a drill. The controller indicates to confirm that the foreign object was a drill. The pilot informed to other pilots that were on approach to pay attention when passing exit taxiway N5.

Time (LT)	Excerpt communication
0611– 0615	Two aircraft departure and one aircraft landing. There was no communication related to the objects on the runway.
Based on controller report (time are estimate): - At 0615, the controller contacted the airport runway maintenance but was not replied. The controller contacted ARFF personnel and informed that there were objects reported on the runway and requested to check and remove them. - At 0616, the ARFF team used command car proceeds to the taxiway N5. - At 0618, the ARFF personnel via access road, arrived on the runway intersection and requested to the controller to enter the runway. The controller instructed to wait and would be approved to enter the runway after 3 aircraft landing. - Between 0615 LT and 0619 LT two aircraft departure.	
0618	A B737 NG landed and the controller instructed the pilot to exit the runway via taxiway N6 due to reported objects on runway. The B 737 NG pilot informed the controller that the objects were on the centerline of the runway just before exit taxiway N5. Confirming that the objects were drilling equipment with long cable on the center line of the runway just before taxiway N5.
0619	Wing Air 1861 landed. The pilot reported to the controller related to objects consisted of drilling equipment and rope and was acknowledged by the controller.
0622	CRJ 1000 aircraft landed and the pilot informed the controller that there was big piece of metal objects on the runway centerline near the intersection with taxiway N5 and suggested to remove the object.
0623	B 737 landed
0623	The controller instructed two aircraft to hold at the point NIMAS to provide sufficient time for ARFF personnel to remove the objects and to check the runway.
Based on controller report (time is estimated): At 0625, the ARFF personnel requested to controller to enter the runway and was approved by the controller. The ARFF personnel entered the runway and removed a hammer jack, a chisel and high air pressure hose from the runway	

Time (LT)	Excerpt communication
	centerline near the intersection taxiway N5. After remove the objects, the ARFF personnel conducted inspection the runway started from the beginning runway 10 until the end.
0639	The controller declared runway was clear and the runway returned for normal operation.

1.9 RELATED REGULATION

1.9.1 Civil Aviation Safety Regulation (CASR) Part 170

170.002 Objectives of Air Traffic Services

The objectives of air traffic services shall be to:

- 1) prevent collisions between aircraft;*
- 2) prevent collisions between aircraft on the manoeuvring area and obstruction on that area;*
- 3) expedite and maintain an orderly flow of air traffic;*
- 4) provide advice and information useful for the safe and efficient conduct of flights;*
- 5) notify appropriate organizations regarding aircraft in need of search and rescue aid and assist such organizations as required.*

170.054 Formation on aerodrome conditions and the operational status of associated facilities

Aerodrome control towers and units providing approach control service shall be kept currently informed of the operationally significant conditions of the movement area, including the existence of temporary hazards, and the operational status of any associated facilities at the aerodrome(s) with which they are concerned.

1.9.2 Advisory Circular Number AC170-02

7.1.2 Alerting service provided by aerodrome control towers 7.1.2.1 Aerodrome control towers are responsible for alerting the rescue and fire fighting services whenever:

- a) an aircraft accident has occurred on or in the vicinity of the aerodrome; or,*
- b) information is received that the safety of an aircraft which is or will come under the jurisdiction of the aerodrome control tower may have or has been impaired; or*

- c) requested by the flight crew; or
- d) when otherwise deemed necessary or desirable.

7.3.1.4 RUNWAY INCURSION OR OBSTRUCTED RUNWAY

7.3.1.4.1 In the event the aerodrome controller, after a take-off clearance or a landing clearance has been issued, becomes aware of a runway incursion or the imminent occurrence thereof, or the existence of any obstruction on or in close proximity to the runway likely to impair the safety of an aircraft taking off or landing, appropriate action shall be taken as follows:

- a) cancel the take-off clearance for a departing aircraft;
- b) instruct a landing aircraft to execute a go-around or missed approach;
- c) in all cases inform the aircraft of the runway incursion or obstruction and its location in relation to the runway.

Note.— Animals and flocks of birds may constitute an obstruction with regard to runway operations. In addition, an aborted take-off or a go-around executed after touchdown may expose the aeroplane to the risk of overrunning the runway. Moreover, a low altitude missed approach may expose the aeroplane to the risk of a tail strike. Pilots may, therefore, have to exercise their judgement in accordance with Annex 2, 2.4 concerning the authority of the pilot-in-command of an aircraft.

7.3.1.4.2 Following any occurrence involving an obstruction on the runway or a runway incursion, pilots and controllers shall complete an air traffic incident report in accordance with the ICAO model air traffic incident report form.

1.9.3 Manual of Standard (MOS) Part 139 Volume I; Aerodrome

10.2. Inspeksi dan Pelaporan Aerodrome Serviceability 10.2.2. Obyek – obyek signifikan Semua objek signifikan yang ditemukan dalam pelaksanaan inspeksi, seperti bagian-bagian pesawat udara yang jatuh atau sisa-sisa bangkai burung yang terkena pesawat udara tersebut, harus segera dilaporkan ke pemandu lalulintas penerbangan (ATC), dan jika perlu, kepada Komite Nasional Keselamatan Transportasi (KNKT). Mengacu kepada Advisory Circular (AC) 139-04 tentang pelaporan incident, serious incident, dan accident di Bandar udara.	10.2. Inspection and Reporting of Aerodrome Serviceability 10.2.2. Significant Objects All significant objects found during the inspection, such as parts of aircraft that detach or the remains of dead birds that exposed to the aircraft, must be reported immediately to Air Traffic Controller (ATC) and if necessary, to the Komite Nasional Keselamatan Transportasi (KNKT). Referring to the Advisory Circular (AC) 139-04 on Reporting of an incident, serious incident and accident in an airport.
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10.2.3. Kondisi permukaan pada area pergerakan (Movement Area), termasuk keberadaan air Inspeksi harus dilakukan untuk memeriksa keberadaan: a) Air di permukaan; informasi kondisi air yang ada di permukaan runway agar mengikuti terminology sebagai berikut: i. WET — permukaan basah tetapi tidak ada STANDING WATER. ii. STANDING WATER — untuk operasional pesawat udara, lebih dari 25 persen dari luas permukaan (baik di area yang terisolasi atau tidak) runway dengan panjang dan lebar yang ditutupi oleh air dengan kedalaman lebih dari 3 mm. b) Retak atau pecah; c) Lapisan karet (rubber deposit); d) Ketidakraturan permukaan; e) kerusakan yang disebabkan oleh tumpahan cairan korosif; f) kebocoran pipa pembuangan khususnya yang mengandung butiran halus non kohesif sub-grade di daerah curah hujan tinggi; g) gerusan atau erosi saluran air; h) gundukan rayap atau gundukan lain yang terhalang oleh rerumputan yang panjang; i) tanah lunak, dan j) tanda-tanda lainnya dari kerusakan perkerasan aspal (pavement distress) yaitu berpotensi menjadi hazard. k) Inspeksi juga harus memeriksa bagian runway yang mungkin licin	10.2.3. Surface conditions on the movement area, including the presence of water Inspections should be carried out to check the presence of: a) The water at the surface; information of water conditions on the runway surface shall follow the terminology as follows: i. WET - wet surface but no STANDING WATER. ii. STANDING WATER - for the operations of aircraft, more than 25 percent of the surface area (in isolated areas or not) of the runway with dimension of area that is covered by water with the depth of more than 3 mm. b) Cracked or broken; c) rubber deposit; d) surface irregularities; e) damage that caused by spill of corrosive liquids; f) leakage of disposal pipe line particularly with non-cohesive grains sub-grade in high rainfall areas; g) erosion of waterways; h) the termite mounds or other mounds that covers by tall grass; i) soft soil, and j) other signs of pavement distress damage that could potentially be a hazard. k) Inspection should also check the runway that may become slippery when wet. Especially in the area of runway pavement that do not meet the runway friction
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<i>saat basah. Terutama pada daerah perkerasan runway yang tidak memenuhi ketentuan kekesatan / gesekan runway yang ditetapkan oleh Ditjen Hubud.</i>	requirement as required by DGCA.
10.2.5. Kebersihan Area Pergerakan <i>Inspeksi harus dilakukan untuk memeriksa:</i> <i>a) benda asing (foreign object), seperti komponen pesawat udara atau komponen lainnya;</i> <i>b) perkakas mesin seperti peralatan kecil dan peralatan khusus;</i> <i>c) puing-puing (debris), seperti pasir, bebatuan lepas, beton, kayu, plastik, potongan ban dan lumpur; dan</i> <i>d) perhatian khusus selama dan setelah kegiatan konstruksi, dimana kendaraan dan peralatan berjalan melalui area tanpa perkerasan dalam kondisi basah.</i>	10.2.5. Cleanness of Movement Area Inspections should be carried out to check: a) foreign object, such as aircraft components or other components; b) machinery tools such as small appliances and special equipment; c) debris, such as sand, loose rock, concrete, wood, plastic, pieces of tire and mud; and d) special attention during and after construction, when vehicles and equipment movement on unpaved area during wet conditions.
10.2.11. Check List Inspeksi <i>Operator Bandar udara harus membuat checklist inspeksi untuk petugas yang melaksanakan aerodrome serviceability inspection untuk memastikan kelengkapan/ keseluruhan dalam setiap inspeksi.</i>	10.2.11. Inspection Check List The airport operator must have an inspection checklist for personnel conducting aerodrome serviceability inspection to ensure the completeness / thoroughness of the inspection.
10.2.12. Logbooks Inspeksi <i>Operator Bandar udara harus memelihara logbook inspeksi yang digunakan untuk mencatat tanggal dan waktu dari setiap pelaksanaan aerodrome serviceability inspection dan juga hasil dari setiap inspeksi serta berbagai langkah tindak lanjut yang diambil. Logbook harus disimpan setidaknya selama 2 tahun.</i>	10.2.12. Inspection Logbooks The airport operator shall maintain inspection logbook that records the date and time of each aerodrome serviceability inspection and also the results of each inspection and follow-up actions taken. The Logbook must be kept for at least two years.

1.9.4 ICAO Document 444 Air Traffic Management

7.4.1.4 RUNWAY INCURSION OR OBSTRUCTED RUNWAY

7.4.1.4.1 In the event the aerodrome controller, after a take-off clearance or a landing clearance has been issued, becomes aware of a runway incursion or the imminent occurrence thereof, or the existence of any obstruction on or in close proximity to the runway likely to impair the safety of an aircraft taking off or landing, appropriate action shall be taken as follows:

- a) cancel the take-off clearance for a departing aircraft;*
- b) instruct a landing aircraft to execute a go-around or missed approach;*
- c) in all cases inform the aircraft of the runway incursion or obstruction and its location in relation to the runway.*

Note.— Animals and flocks of birds may constitute an obstruction with regard to runway operations. In addition, an aborted take-off or a go-around executed after touchdown may expose the aeroplane to the risk of overrunning the runway.

Moreover, a low altitude missed approach may expose the aeroplane to the risk of a tail strike. Pilots may, therefore, have to exercise their judgement in accordance with Annex 2, 2.4, concerning the authority of the pilot-in-command of an aircraft.

7.4.1.4.2 Pilots and air traffic controllers shall report any occurrence involving an obstruction on the runway or a runway incursion.

Note 1.— Information regarding runway incursions' reporting forms together with instructions for their completion are contained in the Manual on the Prevention of Runway Incursions (Doc 9870). Attention is drawn to the guidance for analysis, data collection and sharing of data related to runway incursions/incidents (see Chapter 5 of Doc 9870).

Note 2.— The provisions in 7.4.1.4.2 have the objective of supporting the State's safety programme and safety management system (SMS).

1.10 Useful or Effective Investigation Techniques

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

2 ANALYSIS

The aircraft record did not show any aircraft abnormality of malfunction prior to the occurrence and the aircraft serviceability is considered not contribute to the occurrence. The analysis of this report will discuss the relevant issues contributed to the occurrence and issues associated with foreign object present on runway. Therefore, the analysis will discuss the following issues:

- Runway maintenance and inspection
- Hazard report

2.1 Runway Maintenance and Inspection

The maintenance was conducted at night time after the airport operation and took 3 to 4 hours in between the operation of the runway and terminated prior to the next operating hour.

Between 0500 LT and 0606 LT, 11 aircraft departure and one aircraft arrival, no pilot reported the foreign object on the runway. The first pilot report of objects was made at 0609 LT which was after sunrise at 0559 LT. This indicated that the objects were not clearly visible during dark time.

The objects found on the runway were on dark color and found on dark surface which was runway asphalt that also covered by rubber deposit. These conditions had made the objects with significant size, were not clearly visible during the dark time. Without proper procedure or system to ensure all equipment had been used were completely collected, might have made the equipment had left on the runway.

The runway maintenance was performed by a company that did not have experience performing task on the airside. The requirement of the runway safety for aircraft operation might have not been understood thoroughly by the company and might result in the lack of awareness to the hazard and risk of the operation on the airside.

The Aerodrome Manual stated that the Airport Operation and Readiness is responsible to ensure that the runway was safe for operation and comply with the DGCA requirement. The Airport Operation and Readiness Department responsible to conduct runway inspection that schedules twice per day including before the operation of the airport. The ARFF, AMC, AVSEC and ADC may assist the movement area inspection however the responsibility remains on the Airport Operation and Readiness Department.

The Aerodrome Manual Surabaya did not mention any special runway inspection procedure after runway maintenance, even though it was required by the MOS 139 chapter 10.2.5 d. The absence of the procedure might lead to the normal runway inspection performed after the runway maintenance.

The ARFF personnel conducted runway inspection while warming up and check the ARFF vehicle. The investigation did not find any document indicated that the ARFF personnel have been trained for runway inspection. The Airport Operation and Readiness personnel was also performed runway inspection using patrol car. The runway inspection by ARFF personnel and Airport Operation and Readiness personnel was conducted while the runway maintenance was still performed near intersection taxiway N3.

After the completion of runway maintenance, no runway inspection was performed.

Assigning a company with no experience in performing task on the airside, without proper procedure or system had made the objects with significant size that not clearly visible located on dark surface left on the runway.

The runway inspection that was performed while the runway maintenance has not been finished resulted in the object left on the runway did not inspect.

2.2 Hazard Report

After completion of runway maintenance and received the information that the runway was cleared, the runway was opened for operation on 0500 LT and the first arrival aircraft was at 0508 LT.

Between 0500 LT and 0606 LT, 11 aircraft departure and one arrival, no pilot reported the foreign object on the runway. The first pilot report of objects was near the intersection taxiway N5 and was made at 0609 LT which was after sunrise at 0559 LT. This indicated that the objects were not clearly visible during dark time.

The information provided by the pilot mentioned something looked like a cable with drilling equipment located about exit taxiway N5. The controller reconfirmed three times the position the reported objects and was answered that the position was about exit of taxiway N5. The second report made by a pilot of the landing aircraft at 0618 LT, reported the object in similar way without mentioning the exact position and detail description of the object.

This information provided by the pilots did not clearly describe the objects such as estimated size or weight, material and the exact position. The position reported by the pilots did not clearly describe the exact position of the object compared to the position of the objects found by ARFF personnel. The insufficient information might have made the controller considered that the consequences of the reported object to the runway operation was less severe and decided to continue the runway operation.

Since the beginning of the operation of the airport until the occurrence, 15 aircraft departed and no pilot report related to the object on the runway and all aircraft safely departure. This condition might develop sense to the controller that the runway was safe for the operation. Refer to the position of the objects found on the runway, which were approximately 1,800 meters from the beginning runway 10, it is most likely that aircraft would had been lift off and the objects were not affecting departure aircraft.

The controller requested ARFF to check the reported objects and when the ARFF personnel arrived to the site, the controller instructed to hold and wait for three aircraft to land. This instruction indicated that the controller did not aware of the actual consequences of the reported object that might be caused by the incomplete information. While the ARFF personnel waiting to enter the runway, the Wings Air 1861 landed and struck the object.

The AC 170-02 stated that after the controller receive information of existence of any obstruction on or in close proximity to the runway likely to impair the safety of an aircraft taking off or landing, appropriate action shall be taken which might be cancelling takeoff or landing clearance and inform the location of the in relation to the runway.

Thereafter, a pilot of landing aircraft reported big piece of metal on the runway centerline, on the intersection of the runway and taxiway N5. This information contained significant information of the size and material of the object also more precise position. Afterward the ARFF approved to enter the runway and removed the objects.

Sufficient information is required to be able to assess the consequences of the existing hazard. The pilot provided information of hazard that might be insufficient to determine the consequences of the hazard. This insufficient information was not clarified to get adequate information to make proper decision.

The insufficient information resulted in the assessment of the consequences of the hazard was less severe and kept the runway operation. The ARFF personnel was instructed to hold was also caused by the result of the hazard assessment.

The insufficient information might lead to incorrect assessment to the hazard and resulted in keeping the runway for operation and the delayed on removing the object from the active runway.

3 CONCLUSIONS

3.1 Findings⁷

1. The aircraft was airworthy prior to the occurrence and was operated within the weight and balance envelope. Investigation considered that the aircraft serviceability did not contribute to the occurrence.
2. All crew has valid licenses and medical certificates.
3. All airport equipment, facilities, such as, navigation aids, communication and supporting operational facilities in Juanda Airport operated normally.
4. The runway maintenance was start at 0100 LT. The runway maintenance was planned to repair seven locations on the runway among 11 reported damages. The runway repair started from the damage spot near the beginning of runway 10 and continued until the seventh damage spot near the intersection taxiway N3.
5. The runway maintenance team consisted of 10 personnel. The tools used for this runway maintenance included pneumatic compressor, jack hammer, chisel, high air pressure hose, asphalt mixer, small container for asphalt mixture, debris sweeper and four supporting vehicles.
6. The runway inspection by ARFF personnel and Airport Operation and Readiness personnel was conducted while the runway maintenance was still performed near intersection taxiway N3. The result of the runway inspection was reported to Juanda Tower controller that the runway was clear from any hazard except the area near intersection N3 where the runway repair was still in progress. After the completion of runway maintenance, no runway inspection was performed.
7. The airport maintenance team reported to Juanda tower controller at 0450 LT that the runway repair had finished and the runway maintenance team had left the runway.
8. The Aerodrome Manual stated that the operational hours of the airport started at 0600 until 2400 LT however the airport operational initiated at 0500 LT. Investigation did not find NOTAM or procedure to open the aerodrome before operational hours.
9. Since the airport operation started at 0500 until 0609 LT, 11 aircraft departed and two aircraft arrived and no pilot report regarding the object on the runway. The first pilot report of the object was after sunrise at 0609 LT, indicated that the objects were not clearly visible in the dark.
10. The first and second pilot reports did not clearly describe the exact location and the detail description of the object. This insufficient information was not clarified to get adequate information to make proper decision. The insufficient information might have made the controller considered that the consequences of the reported object to the runway operation was less severe and decided to continue the runway operation.

⁷ Findings are statements of all significant conditions, events or circumstances in the accident sequence. The findings are significant steps in the accident sequence, but they are not always causal, or indicate deficiencies. Some findings point out the conditions that pre-existed the accident sequence, but they are usually essential to the understanding of the occurrence, usually in chronological order.

11. At 0612 LT, the controller contacted the Airport Operation and Readiness personnel with no reply. Subsequently the ATC controller contacted the ARFF personnel and requested to check the reported object on the runway.
After the ARFF arrived near the runway, the controller instructed to wait for three aircraft that were about to land.
12. At 0620 LT, an ATR 72-212A (600 version) registered PK-WGK with flight number IW1861 landed and impacted chisel, resulted in eight holes on the aircraft lower fuselage.
13. At 0622 LT, a CRJ 1000 landed and the pilot reported that the objects were big piece of metal on the runway center line near the intersection with taxiway N5.
14. At 0623 LT, the controller decided to hold all departure and arrival aircraft and allowed ARFF personnel to check the reported object on the runway.
15. ARFF personnel entered the runway and found objects around the runway centerline on the intersection with taxiway N5. The objects consisted of compressor hose (about 10 meters long), jack hammer (about 60 cm long) and chisel (about 4.5 kg).
16. The Aerodrome Manual Juanda presented without any identification number and the revision status. This made difficult to check the update status of the Aerodrome Manual Juanda.
17. Investigation revealed that the runway maintenance was conducted by assigned company that employed mostly a construction worker who had not any qualification and experience of performing task on airside. Investigation did not find the procedure and specification requirement to assign the company for runway maintenance.
18. Investigation did not find the hazard identification and risk assessment for assigning the company that did not have experience of performing task on airside.
19. The investigation did not find any checklist to conduct the runway maintenance including the checklist of tool and equipment completeness before and after the runway maintenance.
20. The investigation did not find procedure for runway inspection following runway maintenance or construction work on movement area.

3.2 Contributing Factors⁸

- The runway inspection that was performed while the runway maintenance has not been finished resulted in the object which were on dark color and found on dark surface did not properly inspect.
- The insufficient information regarding the objects and the location might have made improper assessment to the consequences of the runway operation and delaying the object removal.

⁸ Contributing Factors are those events in which alone, or in combination with others, resulted in injury or damage. This can be an act, omission, conditions, or circumstances if eliminated or avoided would have prevented the occurrence or would have mitigated the resulting injuries or damages.

4 SAFETY ACTION

At the time of issuing this final report, the Komite Nasional Keselamatan Transportasi had not been informed of safety actions resulting from this occurrence taken by PT. Angkasa Pura I Branch Office Juanda International Airport and AirNav Indonesia Branch Office Juanda.

5 SAFETY RECOMMENDATIONS

The Komite Nasional Keselamatan Transportasi issued safety recommendations to address safety issues identified in this report.

DGCA requested to ensure that the recommendations addressed to the relevant parties are well implemented.

5.1 PT. Angkasa Pura I Branch Office Juanda International Airport

- **04.B-2018-14.1**

Investigation did not find the procedure of hazard identification and risk assessment on assignment of company without experience of performing task on airside. Therefore, the KNKT recommend for developing procedure of hazard identification and risk assessment for assigning the company that did not have experience of performing task on airside.

- **04.B-2018-14.2**

The investigation did not find procedure for runway inspection following runway maintenance or construction work on movement area including the checklist of tool and equipment completeness before and after the runway maintenance. KNKT recommend to develop procedure of inspection following runway maintenance or construction work on movement area.

- **04.B-2018-14.3**

The controller contacted the Airport Operation and Readiness personnel to report of object on the runway but was no replied. KNKT recommend that personnel of each department involve in the operational of the airport shall be available during the airport operation.

- **04.B-2018-14.4**

The Aerodrome Manual Juanda presented without any identification number and the revision status. This made difficult to check the update status of the Aerodrome Manual Juanda. KNKT recommend to include identification number and revision status of manual issued by Angkasa Pura I Branch Office Juanda International Airport.

- **04.B-2018-14.5**

The Aerodrome Manual stated that the operational hours of the airport started at 0600 until 2400 LT however the airport operational initiated at 0500 LT. Investigation did not find NOTAM or procedure to open the aerodrome before operational hours. KNKT recommend to update the manual accordance to the current operation condition.

5.2 Airnav Indonesia Branch Office Juanda

- **04.A-2018-14.6**

The AC 170-02 stated that after the controller receive information of existence of any obstruction on or in close proximity to the runway likely to impair the safety of an aircraft taking off or landing, appropriate action shall be taken which might be cancelling takeoff or landing clearance and inform the location of the in relation to the runway. The first and second pilot reports did not clearly describe the exact location and the detail description of the object.

This insufficient information was not clarified to get adequate information to make proper decision.

KNKT recommend the Airnav Indonesia Branch Office Juanda to develop procedure of action to be taken by controller after receiving information existence of any obstruction likely to impair the safety of an aircraft operation.

6 APPENDICES

6.1 Comment from Bureau d'Enquêtes et d'Analyses (BEA)

KNKT received comment from Bureau d'Enquêtes et d'Analyses (BEA) requesting to change the aircraft type from ATR 72-600 to ATR 72-212A (600 version) and KNKT accepted the comment.

6.2 Comment from Directorate of Airport

Refer to the letter from the airport service with reference number 2881/DBU/VIII/2018 issued on 28 August 2018, the airport service provided KNKT the comment to the PK-WGK Draft Final Report. The comment was written in Bahasa Indonesia and did not mention comment suggestion to the report.

Some point of the comment in the letter recalled the KNKT recommendation however the comment was not supported by the evidence to the recommendation.

KNKT accepted the letter however the report remains unchanged.

6.3 Comment from Airnav Indonesia Branch Surabaya

The Airnav Indonesia branch Surabaya issued comment to the PK-WGK Draft Final Report on 16 July 2018 and the letter intended not to change the draft report.

KNKT accepted the letter and the report remains unchanged.

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