

PRELIMINARY
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NATIONAL TRANSPORTATION SAFETY COMMITTEE

Aircraft Accident Investigation Report

Sukhoi Civil Aircraft Company
Sukhoi RRJ-95B; 97004
Mount Salak, West Java
Republic of Indonesia
9 May 2012



NATIONAL TRANSPORTATION SAFETY COMMITTEE
MINISTRY OF TRANSPORTATION
REPUBLIC OF INDONESIA
2012

This Preliminary Report was produced by the National Transportation Safety Committee (NTSC), Transportation Building 3rd Floor, 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, Indonesian Aviation Act (UU No.1/2009), and Government Regulation (PP No. 3/2001).

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GLOSSARY OF ABBREVIATIONS

ALERFA	Alert Phase when there is apprehension about the safety of an aircraft and its occupants where communication is not received or the aircraft fails to arrive within 60 minutes of a prescribed time.
APU	Auxiliary Power Unit
ATC	Air Traffic Controller
ATS	Air Traffic Services
BASARNAS	<i>Badan SAR Nasional</i> (National Search and Rescue Agency)
BMKG	<i>Badan Meteorologi Klimatologi dan Geofisika</i> (Meteorological Climatological and Geophysical Agency)
C	Celsius
CVR	Cockpit Voice Recorder
<i>Dinas Pengembangan Operasi, Markas Besar TNI Angkatan Udara</i>	The Indonesian Air Force Headquarter, Office For Operation Development.
DISTRESFA	Distress Phase when there is reasonable certainty that the aircraft and its occupants are threatened by grave and imminent danger.
DME	Distance Measuring Equipment
ELT	Emergency Locator Transmitter
FDR	Flight Data Recorder
FMS	Flight Management System
Ft	Feet
GPS	Global Positioning System
Hr	Hour
IAC	Interstate Aviation Committee of the Federation of Russia
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
INCERFA	Uncertainty Phase when there is concern about the safety of an aircraft and its occupants where communication is not received or the aircraft fails to arrive within 30 minutes of a prescribed time.
IRS	Inertial Reference System
JAATS	Jakarta Automated Air Traffic Services
Km	Kilometre
KNKT (NTSC)	<i>Komite Nasional Keselamatan Transportasi</i> (National Transportation Safety Committee)
LT	Local Time
M	Meter
Mb	Millibars
MHz	Megahertz
MORA	Minimum Off Route Altitude

MSA	Minimum Safe Altitude
<i>Pusat Kedokteran dan Kesehatan Kepolisian Republik Indonesia</i>	: Centre for Health and Medical Service of the Indonesian National Police
RCC	Rescue Coordinator Centre
SCAC	Sukhoi Civil Aircraft Company
TAFOR	Terminal Aerodrome Forecast
TAWS	Terrain Awareness and Warning System
TBA	To Be Advised
UTC	Universal Time Coordinate
VOR	Very high frequency Omnidirectional Range
QFE	Height above airport elevation based on local station pressure
QNH	Height above mean sea level based on local station pressure

INTRODUCTION

SYNOPSIS

The synopsis will be included in the final report

1 FACTUAL INFORMATION

1.1 HISTORY OF THE FLIGHT

The history of the flight on this preliminary report utilized information obtained from sources such as air traffic services transcripts, BASARNAS report, and witness accounts. Other sources of information such as, flight records, flight data recorder, cockpit voice recorder, ATC radar recording will be included in the final report.

A Sukhoi RRJ-95B aircraft, registered 97004 and with flight number RA 36801 on 9 May 2012 was on a demonstration flight. This flight was the second of the two scheduled demonstration flights.

On board of this flight were 2 pilots, one navigator, one test flight engineer, and 41 passengers. The 41 passengers consisted of 4 Sukhoi Civil Aircraft Company (SCAC) personnel, one engine manufacturer (SNECMA) personnel, and 36 invited passengers (including one American nationality, one France nationality and 34 Indonesian nationalities)

At 0200 UTC¹, the flight plan was filed at the airport briefing office by a flight operation officer of a local airport ground handling agency. The filed flight plan was for both demonstration flights.

The first demonstration flight was scheduled at 0400 UTC, while the second demonstration flight was scheduled at 0645 UTC.

The first demonstration flight departed Halim at 0443 UTC and arrived at 0505 UTC.

The filed flight plan for the second demonstration flight was Halim Perdanakusuma International Airport (WIIH/HLP) Halim² to Pelabuhan Ratu, radial 200 from HLM VOR then return to Halim. The filed flight altitude was 10,000 feet and the estimated elapse time was 30 minutes with total endurance of 4 hours. The flight was planned under IFR.

At 0705 UTC, the second demonstration flight requested start and pushback.

At 0714 UTC, the flight cleared for taxi runway 06.

At 0718 UTC, Air Traffic Controller (ATC) issued clearance to the flight that after take-off initially to maintain runway heading until passing 2000 feet, then to make a right turn to intercept radial 200 from HLM VOR and climb to 10,000 feet.

¹ The 24-hours clock in Coordinated Universal Time (UTC) is used in this report to describe the local time as specific events occurred. Local time is UTC+7 hours.

² Halim Perdanakusuma International Airport (WIIH/HLP), Jakarta is referred to as 'Halim' in this report

The pilot read back the clearance that after departure maintain runway heading than turn right to radial 200 degrees. ATC made correction to emphasis that turn has to be made after passing two thousand. The pilot replied that they acknowledge the message.

At 0719 UTC, the flight was cleared for take-off.

At 0721 UTC, the flight was airborne and instructed to contact Jakarta Approach.

At 0724 UTC, the pilot contacted Jakarta Approach and informed the flight established on radial 200 degrees HLM VOR and reached 10,000 feet. Jakarta Approach controller replied that the flight has been identified on the radar screen and instructed the flight to maintain 10,000 feet and continue to the area. The pilot acknowledged the ATC instruction.

At 0726 UTC, the pilot contacted Jakarta Approach and requested for descend to 6,000 feet. The Jakarta Approach controller asked the pilot to repeat the request.

The pilot repeated the request for descend to 6,000 feet. Subsequently, Jakarta Approach controller responded and acknowledged the request by replying '6,000 copied'. The pilot replied: "Descend to 6,000 feet".

At 0728 UTC, the pilot contacted Jakarta Approach controller to request for making right orbit. The Jakarta Approach controller approved the flight to make orbit to the right at 6,000 feet.

According to the controller on duty statement, the radar display indicated that the aircraft was over WI(R)-4 Atang Sanjaya Training Area when asking for the orbit.

The WI(R)-4 airspace area extending from ground to 6,000 feet. The area was about 17 Nm southwest from HLM VOR/DME.

At 0750 UTC, according to the Daily Report provided by Air Traffic Services Operation, the controller on duty noticed that the flight target disappeared on the radar monitor.

At 0752 UTC, the controller on duty attempted to contact the RA 36801 flight three times. At 0754 UTC, the Jakarta Approach reattempted to contact the RA36801 flight. There was no reply from the flight.

At 0755 UTC, according to the Daily Report provided by Air Traffic Services Operation, the controller on duty reported the situation to the Air Traffic Services Operation Regional Coordinator (ATS Coordinator). The ATS Coordinator made an internal coordination with Halim officer on duty regarding the position of the aircraft. However the aircraft position was unknown.

ATS Coordinator during interview stated:

- At 0835 UTC, declared INCERFA.
- At 0855 UTC, declared ALERFA and informed the BASARNAS.
- At 1122 UTC, declared DISTRESFA.

At 0900 UTC, the BASARNAS commenced the search and rescue operation.

On 10 May 2012 at 0135 UTC, the location of the aircraft was identified.

According to BASARNAS report, the aircraft wreckage was found at a ridge of Mount Salak at approximately 6,000 feet. The impact point was at coordinate 06° 42' 36" S 106° 44' 41" E or on radial 198 from HLM VOR at 28 Nm. The aircraft impacted to an 85 degree slope ridge.

All occupants were fatally injured and aircraft was destroyed.

1.2 INJURIES TO PERSONS

Injuries	Flight crew	Passengers	Total in Aircraft	Others
Fatal	4	41	45	-
Serious	-	-	-	-
Minor/None	-	-	-	Not applicable
TOTAL	4	41	45	-

1.3 DAMAGE TO AIRCRAFT

The aircraft was totally damaged due to the high magnitude of deceleration force.

1.4 OTHER DAMAGE

There was no other damage reported.

1.5 PERSONNEL INFORMATION

1.5.1 Pilot in command

Gender : Male
Age : 57 years

Nationality	:	Russian
Date of joining company	:	01 November 2003
License	:	Test pilot
Date of issue	:	TBA
Valid to	:	20 February 2013
Type rating	:	TBA
Date of last medical	:	TBA
Last line check	:	TBA
Last proficiency check	:	TBA
FLIGHT TIME		
Total time	:	10, 347 hours
This make & model	:	1348 hours 47 minutes
Last 90 days	:	78 hours 22 minutes
Last 30 days	:	21 hours 35 minutes
Last 24 Hours	:	1 hours 41 minutes
This Flight	:	16 minutes
Hours on duty prior to occurrence	:	4 hours 7 minutes
Hours off prior to duty	:	18 hours 23 minutes
Hours awake prior to occurrence	:	7 hours 20 minutes
Duration of last sleep	:	8 hours 30 minutes

1.5.2 First officer

Gender	:	Male
Age	:	44 years
Nationality	:	Russian
Date of joining company	:	22 January 2010
License	:	Test Pilot
Date of issue	:	TBA
Valid to	:	21 September 2012
Type rating	:	TBA
Date of last medical	:	TBA
Last line check	:	TBA
Last proficiency check	:	TBA

FLIGHT TIME

Total time	:	3,318 hours
This make & model	:	625 hours
Last 90 days	:	98 hours 43 minutes
Last 30 days	:	34 hours 17 minutes
Last 24 Hours	:	1 hours 41 minutes
This Flight	:	16 minutes
Hours on duty prior to occurrence	:	4 hours 7 minutes
Hours off prior to duty	:	18 hours 23 minutes
Hours awake prior to occurrence	:	6 hours 50 minutes
Duration of last sleep	:	9 hours

1.5.3 Navigator

Gender	:	Male
Age	:	51 years
Nationality	:	Russian
Date of joining company	:	19 April 2006
License	:	Navigator
Date of issue	:	TBA
Valid to	:	17 January 2013
Type rating	:	TBA
Date of last medical	:	TBA
Last line check	:	TBA
Last proficiency check	:	TBA

FLIGHT TIME

Total time	:	3,533 hours
This make & model	:	485 hours
Last 90 days	:	64 hours 39 minutes
Last 30 days	:	46 hours 28 minutes
Last 24 Hours	:	1 hours 41 minutes
This Flight	:	16 minutes
Hours on duty prior to occurrence	:	4 hours 7 minutes

Hours off prior to duty	:	18 hours 23 minutes
Hours awake prior to occurrence	:	7 hours 20 minutes
Duration of last sleep	:	8 hours 30 minutes

1.5.4 ATC Controller at Jakarta APP

Gender	:	Male
Age	:	44 year
Nationality	:	Indonesian
Date of joining company	:	TBA
License	:	Senior ATC
Date of issue	:	1 April 2000
Last validation check	:	1 March 2012
Valid to	:	1 March 2014
Rating	:	Radar Controller
Date of last medical	:	14 February 2012
Last performance check	:	1 February 2012
Hours on duty prior to occurrence	:	TBA
Hours off prior to duty	:	TBA
Hours awake prior to occurrence	:	TBA
Duration of last sleep	:	TBA

1.6 AIRCRAFT INFORMATION

1.6.1 General

Registration Mark	:	97004
Manufacturer	:	Sukhoi Civil Aircraft Company (SCAC)
Country of Manufacturer	:	Federation of Russia
Type/ Model	:	RRJ -95B
Serial Number	:	95004
Date of manufacture	:	9 August 2009
Certificate of Airworthiness		
Issued	:	5 December 2010
Validity	:	24 July 2014

Certificate of Registration

Issued	: 5 December 2010
Validity	: 24 July 2014
Category	: Experimental passenger airplane
Crew (Cockpit/Cabin)	: TBA
Time Since New	: 843 hours 58 minutes
Cycles Since New	: TBA
Last Major Check	: None
Last Minor Check	: 73 hours 7 minutes

1.6.2 Engines

Manufacturer	: NPO “Saturn”
Type/Model	: SaM 146
Serial Number-1 engine	: SaM-146108
▪ Time Since New	: 482 hours 1 minute
▪ Cycles Since New	: TBA
Serial Number-2 engine	: SaM-146106
▪ Time Since New	: 1039 hours 3 minutes
▪ Cycles Since New	: TBA

1.6.3 Aircraft Status Statement

The Sukhoi Civil Aircraft Company (SCAC) provided the following information:

According to aircraft RRJ-95B tail number 97004 registration documentation this aircraft was clarified as civil (passenger) airworthy aircraft. Airworthiness in accordance with ICAO standards means the compliance of the aircraft to the applicable airworthiness requirements. On this aircraft was issued the Experimental aircraft airworthiness Certificate № 95/13-415.

The civil aircraft RRJ-95B tail number 97004 had the status of experimental civil aircraft, due to applicable Russian regulations:

- it was not designed for commercial operation , i.e. transportation of passengers by fare*
- it was not the property of commercial operation airline*
- it was equipped with additional flight test equipment (Data acquisition system, work stations for on-board engineers in cabin), which do not affect aircraft airworthiness*

In preparation for the flights, which involve technical crew transportation on board of the aircraft, JSC SCAC prepared Appearance of Aircraft RRJ0000-SP-100-067

This document confirms that on 13.04.2010 aircraft RRJ-95B tail number 97004 did not have deviations from type design which were able to affect flight safety.

Demonstration flights Program in Indonesia RRJ 95-130-023-DEM was approved by independent authorized agency – ULS Aviaprom.

The same authority approved the Certificate of Readiness for aircraft RRJ-95B tail number 97004, crew and specialists for implementation of RRJ 95-130-023-DEM program.

Taking into account all the above mentioned Russian and Indonesian authorities issued clearances for flights realization.

1.7 METEOROLOGICAL INFORMATION

1.7.1 Halim TAFOR issued by *Dinas Pengembangan Operasi, Markas Besar TNI Angkatan Udara*

		0700 UTC	0800 UTC	0900 UTC
Wind	:	090 / 6 knot	050 / 8 knot	030 / 8 knot
Visibility	:	5 km	5 km	5 km
Weather	:	Haze	Haze	Haze
Cloud	:	SCT 017	BKN 017	FEW 16 CB
TT/TD	:	33 / 24	32 / 24	31 / 25
QNH (mb/in Hg)	:	1010/29.83	1009/29.82	1009/29.82
QFE (mb/in Hg)	:	1007/29.73	1006/29.72	1006/29.72

1.7.2 Weather observation from the BMKG office (Darmaga, Bogor).

The Darmaga meteorology observation office is the nearest meteorology station to the accident site, approximately 7 Nm.

		0700 UTC	0800 UTC	0900 UTC
Wind	:	Southeast at 5 knots	Calm	Calm
Visibility (m)	:	4000	4000	4000
Weather	:	Haze	Haze	Haze

Cloud	:	6 octas	5 octas Cumulonimbus	5 octas Cumulonimbus
Cloud Base (m)	:	600	600	600
QNH (mb)	:	1011	1011	1011

1.7.3 Satellite image on the day of occurrence

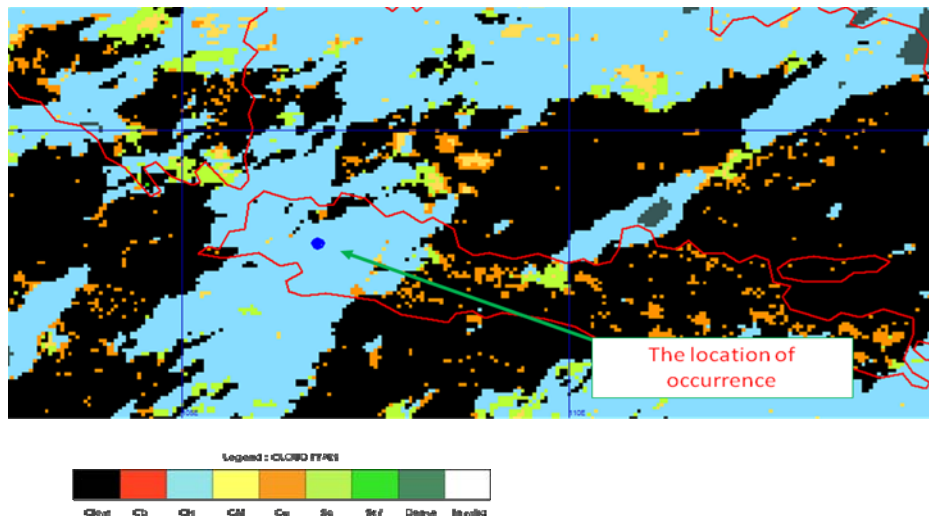


Figure 1: Satellite image at 0700 UTC

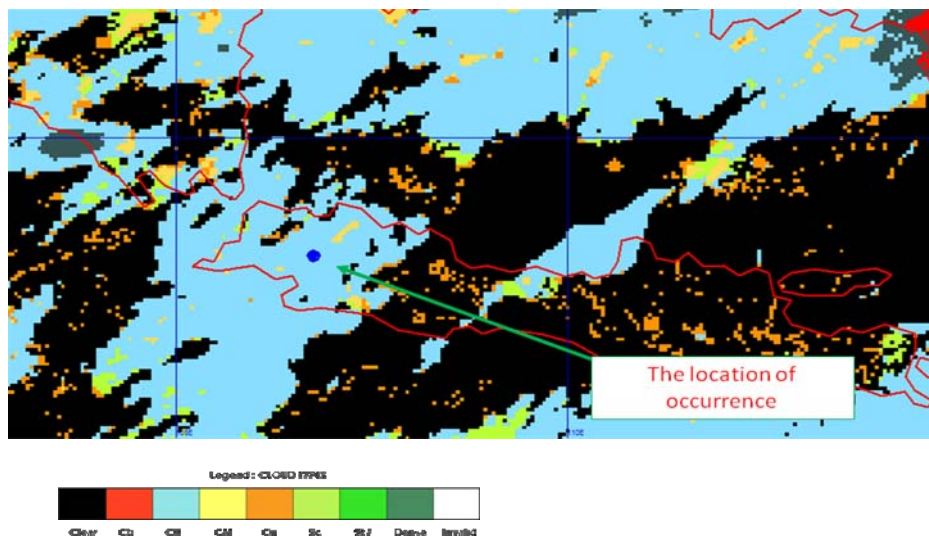
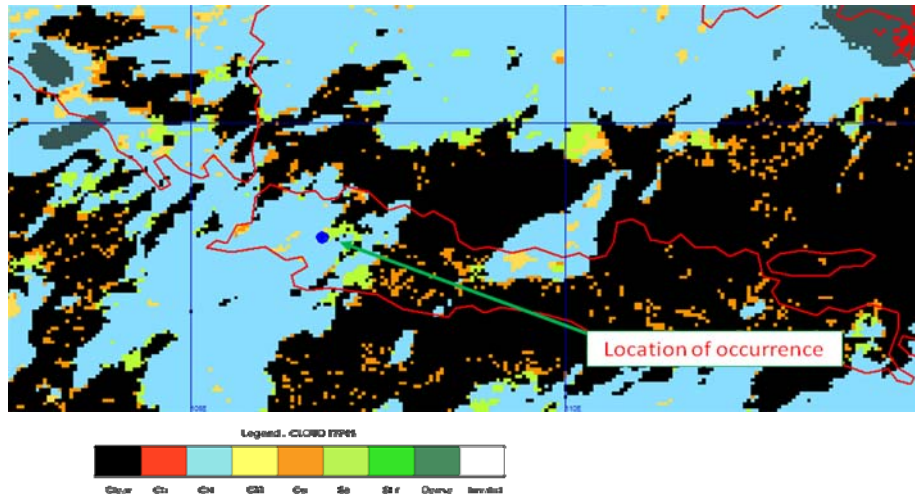


Figure 2: Satellite image at 0800 UTC



1.10 AERODROME INFORMATION

Airport Name	: Halim Perdanakusuma International Airport
Airport Identification	: WIIH / HLP
Coordinate	: 06° 17' 03" S 106° 53' 06" E
Elevation	: 84 feet
Airport Operator	: PT. Angkasa Pura II (Persero)
Runway Direction	: 06 – 24
Runway Length	: 3,000 meters
Runway Width	: 45 meters
Surface	: Asphalt concrete

1.11 FLIGHT RECORDERS

1.11.1 Flight Data Recorder (FDR)

Manufacturer	: L3 Communication
Type/Model	: FA2100
Part Number	: 2100-2043012
Serial Number	: 000447319

The Flight Data Recorder (FDR) recovered from the accident site on 31 May 2012. The FDR was found in relatively good condition. The data were downloaded by the NTSC at its facility and contain 471 parameters for the 150 flight hours, including approximately 22 minutes recording of the accident flight, started from engine start.

The Sukhoi experts participated during the download process.

The analysis of the FDR will be included in the final report.

1.11.2 Cockpit Voice Recorder (CVR)

Manufacturer	: L3 Communication
Type/Model	: FA2100
Part Number	: 2100-1025-12
Serial Number	: 000501504

The Cockpit Voice Recorder (CVR) was recovered from the accident site at 15 May 2012. The CVR was found partly burnt and bent. However, the memory

module was found in good condition. The temperature marking labeled 182 degree C on the memory module remains intact without any change in color.

The Russian investigation team including Accredited Representative of the Interstate Aviation Committee (IAC) participated during the opening the protective shell and setting up the memory module onto the serviceable CVR frame.

The CVR data were successfully downloaded by NTSC at its facility. The CVR contains 124 minutes of good quality recording, including 30 minutes of the accident flight starting from pilot preparation by reading checklist.

The CVR data is being transcribed and translated by NTSC and members of the Sukhoi experts.

The analysis of the CVR will be included in the final report.

1.12 WRECKAGE AND IMPACT INFORMATION

The aircraft was impacted at 6,000 feet (according to BASARNAS report) to an approximately 85 degree slope ridge. The wreckages were spread in wide area. Most of the wreckage such as landing gear, engine and vertical stabilizer were found at the bottom of the valley at approximately 500 meters below the impact point.

The area surrounding the impact point was found burnt. Some wreckage on that area was found partially burnt.

The aircraft was destroyed by impact forces and post impact fire.

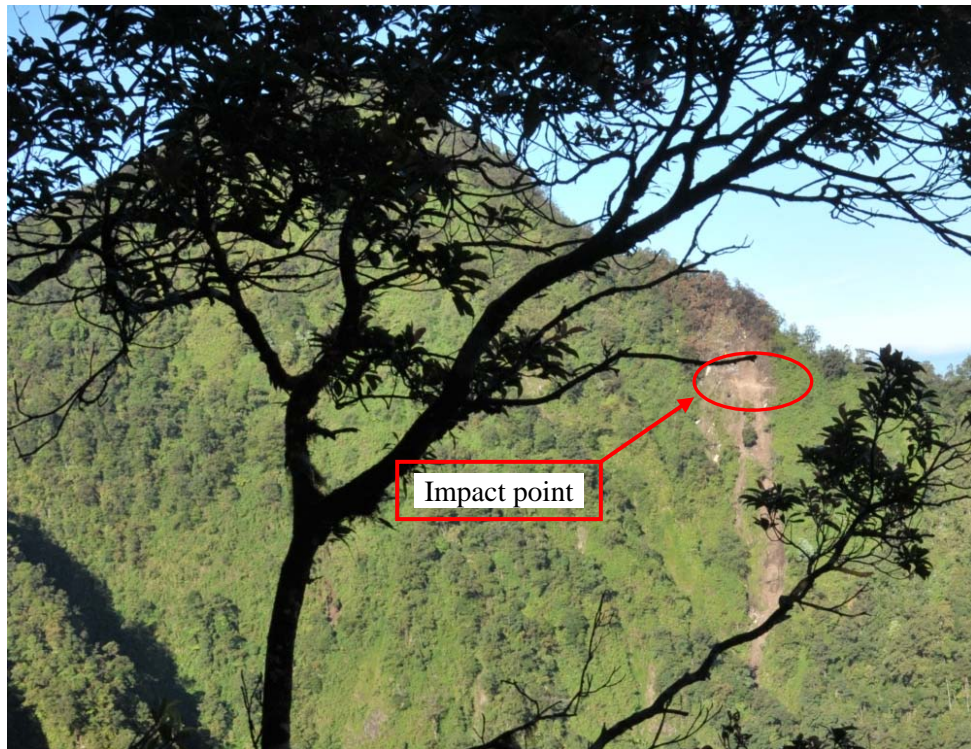


Figure 4: The ridge facing to the east

1.13 MEDICAL AND PATHOLOGICAL INFORMATION

The report of the pathological and toxicological examinations from *Pusat Kedokteran dan Kesehatan Kepolisian Republik Indonesia* for both pilots showed that no alcohol and drugs were detected.

1.14 FIRE

There was no evidence of in-flight fire.

The evidence of fire was found surrounding the impact point, especially above the impact point. Some wreckages and vegetation on that area were burnt. Wreckages found on the valley were found without any indication of fire. This situation indicated a post impact fire.

1.15 SURVIVAL ASPECT

The aircraft was equipped with emergency locator transmitter (ELT 406 MHz), which capable of transmitting to 3 different frequencies: 406 MHz, 121.5 MHz, and 243 MHz.

No distress signal was received by BASARNAS, Australian RCC (Rescue Coordinator Centre), Singapore RCC, and Malaysia RCC.

The ELT was found with antenna detached.



Figure 5: Emergency Locator Transmitter with antenna detached.

The JAATS (Jakarta Automated Air Traffic Services) radar data was used during the search and rescue operation to locate the position of the aircraft.

At the day of the occurrence, Jakarta ATS Coordinator notified BASARNAS at 0855 UTC. The BASARNAS commenced the operation at 0900 UTC by deploying two helicopters. The weather condition around the predicted location prevented the operation by air to locate the aircraft. At 1900 UTC, the ground search and rescue operation commenced.

On 10 May 2012 at 0135 UTC, the site of the occurrence was located.

On 11 May 2012 at 0340 UTC, the ground search and rescue team reached the accident site.

On 12 May 2012, team of Ministry of Emergency Situations of the Federation of Russia arrived in Jakarta to assist BASARNAS search and rescue operation.

The nature of surrounding terrain and weather hampered the search and rescue operation.

On 18 May 2012 the search and rescue operation was terminated.

This accident was not survivable due to the magnitude of the deceleration forces.

1.16 TESTS AND RESEARCH

Where appropriate will be included in the final report.

1.17 ORGANISATIONAL AND MANAGEMENT INFORMATION

1.17.1 Aircraft Manufacturer

Aircraft Manufacturer : Sukhoi Civil Aircraft Company
Address : 23B Building, 2 Polikarpov Street
Moscow 125284 Russia

1.17.2 Ground Handling Agency

PT. Indoasia Ground Utama was the ground handling agency appointed by Sukhoi Civil Aircraft Company to provide services during the promotion/demonstration flight in Jakarta.

The investigation was not able to have the copy of actual crew and passenger manifest immediately after the occurrence. The investigation was informed by the ground handling agency that the manifest was carried on board the aircraft.

Ground handling Agency : PT. Indoasia Ground Utama
Address : Airside area Flops Centre 05 GL
Halim Perdanakusuma International Airport,
Jakarta
PO BOX 4161 JKTJ
Jakarta 13041, INDONESIA

1.18 ADDITIONAL INFORMATION

The investigation is continuing and will include but not limited to an analysis of the CVR, FDR, TAWS, ATC radar recording, flight records, charts being used and operational regulation and procedures and any other relevant information.

1.19 USEFUL OR EFFECTIVE INVESTIGATION TECHNIQUES

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

2 FINDINGS

1. The flight was planned under IFR.
2. The planned flight route itself was not a published airway.
3. The Minimum Off Route Altitude (MORA) for the planned flight route was 13,200 ft.
4. The Minimum Safe Altitude (MSA) from HLM VOR/DME was 6,900 ft. The radius of MSA was 25 Nm from HLM VOR/DME
5. The flight altitude was 10,000 ft.
6. The flight crew asked to descent to 6,000 ft. The ATC cleared the flight to 6,000 ft.
7. The flight requested orbit to the right at 6,000 ft. It was approved by the ATC.
8. The radar display indicated when the aircraft asked for orbit, its position was over the Atang Sanjaya Training Area.
9. The area was about 17 Nm southwest from HLM VOR/DME.
10. The flight impacted with terrain on radial 198 HLM VOR/DME at 28 Nm at approximately 6,000 ft.
11. The crew and passenger manifest was carried on board the aircraft. No copy was available on the Ground Handling agency.

3 RECOMMENDATION

According to factual information and initial finding, the National Transportation Safety Committee had issued Immediate Recommendations on June 22, 2012 to address safety issues identified in this preliminary report.

3.1 IMMEDIATE RECOMMENDATION TO THE INDONESIAN DIRECTORATE GENERAL OF CIVIL AVIATION

- To ensure that all aircraft used for a demonstration flight operated under IFR should be conducted with respect to a published minimum safe flight altitude.
- To ensure a copy of the crew and passenger manifest be available in the Ground handling and Operation Service office prior to flight

3.2 IMMEDIATE RECOMMENDATION TO THE SUKHOI CIVIL AIRCRAFT COMPANY RUSSIAN FEDERATION

- To review the current procedures for the preparation and conduct of a demonstration flight and, if needed, introduce appropriate amendments.
- To arrange additional training for flight crews who will conduct demonstration flights, especially in mountainous regions.
- To ensure a copy of the crew and passenger manifest be available in the Ground handling and Operation Service office prior to flight