



**FINAL INVESTIGATION REPORT  
ON  
HARD LANDING INCIDENT TO  
M/S INDIGO AIRLINE, A-320 AIRCRAFT VT-IEO,  
WHILE LANDING AT  
NSCBI AIRPORT, KOLKATA  
ON  
14.07.2015**



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**DIRECTORATE GENERAL OF CIVIL AVIATION**  
OPPOSITE SAFDARJUNG AIRPORT, AUROBINDO MARG, NEW DELHI-110003

**DISCLAIMER**

*In accordance with the Rule 3 (1) of Aircraft (Investigation of Accidents and Incidents) Rules, 2012, "The sole objective of investigation of this incident is the prevention of accidents and incidents and not to apportion a blame or liability."*

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**INVESTIGATION REPORT ON HARD LANDING INCIDENT TO**  
**M/S INDIGO AIRLINES A320 AIRCRAFT VT-IEO AT KOLKATA AIRPORT**  
**ON 14.07.2015**

1. Aircraft Type : A 320  
Nationality : Indian  
Registration : VT-IEO
2. Owner : M/s Avolon Aerospace AOE 17 Ltd
3. Operator : Indigo Airlines
4. Pilot in Command : CPL Holder  
Extent of Injury : Nil
5. Place of Incident : RWY 19L, NSCBI Airport, Kolkata
6. Geographical Location of Site : N 22.6547°, E 88.4467°
7. Last point of Departure : Ranchi Airport
8. Intended place of landing : NSCBI Airport, Kolkata
9. Type of operation : Schedule Flight
10. Date and time of Incident : 14/07/2015, 13:52 Hrs
11. Passengers/Crew on Board : Crew-06,  
Passenger- 142  
Extent of Injury : Nil
12. Phase of Operation : Landing
13. Type of Incident : Hard landing

**(All the timing in the report is in IST)**

## **SYNOPSIS**

On 14<sup>th</sup> July 2015, an A320 aircraft VT-IEO of M/s Indigo Airlines was involved in hard landing incident during landing at NSCBI Airport, Kolkata, while operating a scheduled flight 6E-347 from Ranchi to Kolkata.

The involved Crew started their first flight of the day with the same aircraft from Kolkata to Ranchi at 11:43 Hrs. The aircraft landed normally at Ranchi airport at 12:31 hrs. After due transit check at Ranchi Airport, aircraft took-off from Ranchi at 13:05 Hrs to Kolkata. At the time of departure from Ranchi, the weather at Kolkata indicated visibility 2800m in haze and no significant change. During the take-off & cruise from Ranchi to Kolkata the flying was normal. However, during approach at Kolkata airport while giving landing clearance, the ATC tower informed the aircraft that there was rain over the airfield. The aircraft was under the control of First Officer (FO). During final approach, the PIC noticed high rate of descent and advised the FO to correct it. At the last moment, the PIC tried to give input to the controls. However, this could not arrest the high Rate of Descent. As a result, the aircraft made hard landing on runway 19L.

There were 06 crew and 142 passengers on board the aircraft including 01 infant. All the persons on-board the aircraft were safe. No pre/post incident fire was reported.

DGCA ordered the investigation of the incident by appointing an Inquiry Officer under Rule 13(1) of the Aircraft (Investigation of Accidents and Incidents) Rules, 2012.

## **1. FACTUAL INFORMATION**

### **1.1. HISTORY OF THE FLIGHT:**

On 14<sup>th</sup> July 2015, an A320 aircraft VT-IEO of M/s Indigo Airlines was involved in hard landing incident during landing at NSCBI Airport, Kolkata, while operating a scheduled flight 6E-347 from Ranchi to Kolkata. There were 06 crew and 142

passengers on board the aircraft including 01 infant. All the persons on-board the aircraft were safe. No pre/post incident fire was reported.

A certified AME carried out layover inspection of the aircraft VT-IEO at Delhi and released for the flight. On 24.07.2015, the aircraft had flown from Delhi to Bangalore and then Bangalore to Kolkata with different set of crew. The involved crew reported at 10:53 Hrs to undergo Pre-Flight Medical Examination at Kolkata Airport. No indication of alcohol consumption by both the crew was observed during the pre-flight medical examination and they were cleared to operate the flight as per schedule. They started their first flight of the day with VT-IEO aircraft from Kolkata to Ranchi at 11:43 Hrs. The aircraft landed normally at Ranchi airport at 12:31 hrs. After due transit check at Ranchi Airport, the aircraft took-off from Ranchi at 13:05 Hrs for Kolkata.

At the time of departure from Ranchi, the weather at Kolkata indicated visibility 2800m in haze and no significant change. During the take-off & cruise from Ranchi to Kolkata the flying was normal. However, during approach at Kolkata airport while giving landing clearance, the ATC tower informed the aircraft that there was rain over the airfield. At this time, controls of the aircraft were with the First Officer (FO). Due to adverse weather conditions at Kolkata Airport, the FO asked the PIC whether he should continue or PIC would like to take command. Since, no response from PIC was heard, FO remained continue with the controls. Just 02 minute before the touch down, the wind direction changed from 140 to 310 and wind speed changed from 05 Knots to 08 Knots. Visibility was also reduced from 2800m to 2000m. PIC noticed high rate of descent during approach and advised the FO to correct it. At the last moment, the PIC tried to give input to the controls. However, this could not arrest the high Rate of Descent. As a result, the aircraft made hard landing on runway 19L.

The aircraft touched down at a vertical speed of 838 fpm with high pitch of 5.6°. The maximum vertical acceleration recorded during landing was 3.129g against the structural limit 2.6g as specified by the manufacturer.

## 1.2. INJURIES TO PERSON

INJURIES	CREW	PASSENGERS	OTHERS
FATAL	Nil	Nil	Nil
SERIOUS	Nil	Nil	Nil
MINOR	Nil	Nil	Nil
NONE	06	142	

## 1.3. DAMAGE TO AIRCRAFT

No damage to the aircraft was reported.

## 1.4. OTHER DAMAGE

NIL

## 1.5 PERSONNEL INFORMATION:

### 1.5.1. Pilot-in-Command

He was an experienced pilot having vast flying experience on various aircraft. He was also a DGCA approved examiner. He was not involved in any Accidents or Serious Incidents previously. Details of his experience at the time of incident are given below:

License type : ATPL  
Valid up to : 15<sup>th</sup> May, 2016  
Aircraft Ratings:  
As PIC : A320, A319 and A321  
Date of Initial Issue : 11-05-1992  
Date of Endorsement : 23.04.1996 for Airbus 320  
Date of Birth : 26.01.1963  
Medical Valid up to : 24.03.2016  
FRT0 No, valid till : 2715, Valid till 15.05.2017

Instrument Rating No. : 1622  
Date of last IR check : 02.03.15  
PC check : 10.09.14

**Flying Details:**

Total Flying Experience : 18083:02 hrs  
Total Flying as Instructor : 3000 Hrs.  
As PIC : 14124:18 Hrs.  
Total Experience as PIC on type : 13733:48 Hrs  
Flying during Last One year : 615:02 Hrs.  
Flying during last 6 months : 377:13 Hrs.  
Flying during Last 30 days : 46:20 Hrs.  
Flying during last 7 days : 13:51 Hrs.  
During last 24 hours : 01:45 hrs

**1.5.2. Co-Pilot**

Type of Licence : CPL,  
Valid till : 26<sup>th</sup> Dec. 2015  
Aircraft Ratings:  
As PIC : Cessna 172, Piper Seneca PA 34  
As FO : A -320  
Date of Initial Issue : 27.12.2010  
Date of Endorsement : 01.06.2011 for A 320  
Date of Birth : 07.05.1985  
Medical Valid up to : 05.01.2017  
FRTO No, valid till : 15814, valid till 26.12.2015  
Instrument Rating No. : 10052  
Date of last IR check : 02.02.2015  
PC check : 02.02.2015

**Flying Details:**

Total Flying Experience : 2617:27 Hrs

Total Flying as As PIC : 122:18 Hrs  
 Total Experience as FO on type : 2348:51 Hrs  
 Flying during Last One year : 639:48 Hrs.  
 Flying during last 6 months : 257:21 Hrs  
 Flying during Last 30 days : 37:44 Hrs  
 Flying during last 7 days : 09:53 Hrs  
 During last 24 hours : 01:45 Hrs

Both the crew were undergone pre-flight breath analyser check as per the provision of CAR Section 5 Series F Part III. No indication of alcohol consumption by any of the involved crew was observed during the check. No exceedance in the Flight Duty Time for both the crew was observed as per the record available.

After involvement in the hard landing incident, privileges of pilot license held by both the crew were suspended by DGCA as per clause (b) of sub-rule (3) of Rule 19 of Aircraft Rules, 1937.

#### 1.6 AIRCRAFT INFORMATION:

Aircraft:	
<b>Manufacturer</b>	Airbus Industries
<b>Type</b>	A-320-232
<b>Constructor's S.No.</b>	4965
<b>Year of Manufacturer</b>	2012
<b>Certificate of Airworthiness</b>	6394, Issued on 09.01.2012, Valid till 08.01.2017
<b>Airworthiness Review Certificate</b>	No. DDG/NR/ARC/2015/03, dated 08.01.2015 Valid till 07.01.2016
<b>Category</b>	Normal
<b>Sub Division</b>	Passenger.
<b>Certificate of</b>	No. 4285



<b>Registration no. and validity</b>	Validity: 08/01/2018
<b>Owner</b>	M/s Avolon Aerospace AOE 17 Limited
<b>Minimum Crew Required</b>	02
<b>Maximum All Up Weight Authorised</b>	73,500 Kg
<b>Last Major Inspection</b>	750 Hrs/120 days at aircraft TSN 12176:37 Hrs on 09.07.2015
<b>Last Inspection</b>	Layover Inspection on 13.07.2015 at aircraft TSN 12215 Hrs
<b>Air frame Hrs. Since New</b>	12220:46 Hrs as on 14.07.15
<b>Air frame Hrs. Since last C of A</b>	1772:24 as on 14.07.15

<b>Engine</b>	
<b>Manufacturer</b>	IAE.
<b>Type</b>	IAE V2527-A5
<b>Serial No.</b>	LH – V15985 RH – V16085
<b>Hours Done Since New</b>	LH Engine: 12220:46 Hrs (as on 14.07.2015) RH Engine: 12220:46 Hrs (as on 14.07.2015)
<b>TSO</b>	N/A
<b>Last Major Inspection Carried out</b>	1200 Hrs inspection schedule on 11.07.2015
<b>Last Inspection Carried Out</b>	Layover Inspection on 13.07.2015 at aircraft TSN 12215 Hrs

<b>Average Consumption</b>	<b>Fuel</b>	Satisfactory
<b>Average Consumption</b>	<b>Oil</b>	LH Engine – 0.041 qtz/hr. RH Engine – 0.027 qtz/hr.

As per the load and trim sheet, the calculated ALW (All-up Landing Weight) was 63,060 Kg which was 1440 Kg below the maximum landing weight. C.G. with LIZFW (Loaded Index at Zero Fuel Weight) was 62.4% and with LITOW (Loaded Index at Take-off Weight) was 59.4% from datum point, which were within the limits. As per manufacturer, C.G. can vary from 37.16% to 85.20% with LIZFW and from 33.51% to 90.68% with LITOW.

#### 1.7 METEOROLOGICAL INFORMATION:

Weather was obtained from the Meteorological Department, Weather report for Kolkata Airport is given below:

**VECC 140650Z 23004KT 2800 Hz SCT018 FEW030CB SCT100 36/29 Q0998  
NOSIG=**

**VECC 140720Z 14006KT 2800 Hz SCT018 FEW030CB BKN100 35/29 Q0998  
NOSIG=**

**VECC 140750Z 14005KT 2800 Hz SCT018 FEW030CB BKN100 35/29 Q0997  
NOSIG=**

**SPECI VECC 140815Z 14005KT 2800 TSRA SCT015 FEW025CB OVC080  
33/29 Q0996 NOSIG=**

**VECC 140820Z 31008KT 2000 TSRA SCT015 FEW025CB OVC080 30/29  
Q0997 TEMPO TL1015 1500 TSRA=**

**SPECI VECC 140830Z 02010KT 0600 R19L/100 RMID/1000 R01R/1000  
R19R/1000 TSRA SCT015 FEW025CB OVC080 28/27 Q0997 TEMPO TL1015  
1500 TSRA=**

**VECC 140850Z 14009KT 0600 R19L/1400 RMID/1200 R01R/1200 R19R/1100  
TSRA SCT015 FEW025CB OVC080 28/27 Q0996 TEMPO TL1015 0800 TSRA=**

From the above weather report, it is observed that at 12:50 IST, just 15 minutes before the departure of aircraft from Ranchi, the weather at Kolkata indicated visibility 2800m in haze, wind direction/ speed 140/06 knots, broken clouds coverage at 10,000 ft with no significant change. The aircraft took-off from Ranchi to Kolkata at 13:05 IST. After 15 minutes of departure at 13:20 IST, weather was the same at Kolkata except wind speed that was changed from 06 Knots to 05 Knots. During approach at Kolkata airport, a SPECI (Special Report) was issued at 13:45 IST which was not received by the crew. The SPECI indicated TSRA (Thunderstorm/Rain) over the airport and overcast clouds coverage at 8000 ft. Visibility reduced to 2000m just 2 minutes before the touchdown and further reduced to 600m at 14:00 IST and wind direction/speed also changed from 140/05 Knots to 310/08 knots. This indicates sudden change in weather at the time of approach and landing.

### **1.8 AIDS TO NAVIGATION:**

Kolkata Airport is equipped with navigational aids like ILS, DME, DVOR, etc. One of the two ILS serving runway 19L and 01R will be operational at a time. Change over from active to non-operational system will be effected with 15 minutes on receipt of request from aircraft. No limitation on serviceability/use of any navigational aid was reported by ATC at the time of incident.

### **1.9 COMMUNICATIONS:**

Two way communications was available at Kolkata Airport. No unserviceability of any communication aid was reported by the ATC as well as by the flight crew.

## 1.10 AERODROME INFORMATION:

Kolkata Airport is known as Netaji Subhas Chandra Bose International Airport, Kolkata. Earlier it was known as Dum Dum Airport. It is largest airport in the eastern india. It is located 17 Km from Center of the city. The Airport has Latitude [22° 39' 13.6" N](#) and Longitude [88° 26' 47.7"E](#). License of Airport was renewed by DGCA on 06.03.2014 and it was valid till 05.03.2016.

## 1.11 FLIGHT RECORDERS:

The aircraft was fitted with both CVR and DFDR of Honeywell company.

CVR : Part No. 980 - 6022 – 001      S.No. CVR 120-12227

DFDR : Part No. 908 – 4700 – 042      S. No. SSFDR-19086

As per DFDR data, rate of descent (ROD) and pitch angle were normal upto 150ft above the runway. After crossing 153 ft, ROD started increasing from 528fpm and reached at 1057fpm before touch-down, which was very high. The aircraft touched down at 13:52 IST at a vertical speed of 838 fpm with high pitch of 5.6°. The maximum vertical acceleration recorded during landing was 3.129g against the structural limit 2.6g as specified by the manufacturer. PIC tried to give the input to control the pitch just 03 seconds before the touch-down, that was too late. DFDR reading at 1second interval for 500 ft Radio Altitude (RA) is shown below:

IST	Alt	RA 1	RA 2	Pitch	Roll	Heading	IAS	Vert Spd	Pitch Comm Capt	Pitch Comm F/O	AP 1	AP 2	Vert Acc
13:51:43	928	506	499	3.5	-1.8	184	139	-535	0	0	1	1	0.984
13:51:44	924	505	495	2.5	-4.6	183	132	-543	0	0	1	1	1.004
13:51:45	912	496	479	1.4	-5.3	182	137	-644	0	0	1	1	0.859
13:51:46	900	474	478	2.1	0.4	182	142	-780	0	0	1	1	0.871
13:51:47	884	458	452	2.8	0.7	182	141	-749	0	0	1	1	1.016
13:51:48	872	450	455	2.8	2.1	183	141	-727	0	0	1	1	0.996
13:51:49	860	437	436	2.8	1.8	183	140	-698	0	0	1	1	0.949

13:51:50	844	426	428	2.5	1.4	184	137	-750	0	0	1	1	0.938
13:51:51	832	404	403	3.2	-1.4	184	136	-796	0	0	1	1	0.957
13:51:52	820	393	395	3.9	-0.4	183	133	-815	0	0	1	1	0.965
13:51:53	816	375	381	4.6	-1.1	183	135	-796	0	0	1	1	0.977
13:51:54	804	373	373	4.9	-1.1	182	136	-689	0	0	1	1	1.043
13:51:55	792	354	365	4.9	1.1	182	137	-589	0	0	1	1	1.043
13:51:56	784	340	349	4.2	1.4	182	136	-478	0	0	1	1	1.035
13:51:57	776	332	334	3.2	-1.4	182	133	-594	0	0	1	1	0.891
13:51:58	760	320	318	3.5	0	182	132	-718	0	0	1	1	0.879
13:51:59	752	299	307	4.6	-1.1	182	135	-763	0	0	1	1	0.965
13:52:00	744	298	302	5.6	-0.4	182	135	-694	0	0	1	1	1.035
13:52:01	732	266	276	5.6	-0.4	182	137	-574	0	0	1	1	1.035
13:52:02	720	285	280	4.9	-0.4	182	135	-523	0	0	1	1	1.023
13:52:03	712	273	276	4.2	0.7	182	140	-507	0	0	1	1	0.965
13:52:04	696	239	259	3.9	1.8	182	136	-578	0	0	1	1	0.879
13:52:05	680	239	247	4.2	-0.7	182	137	-643	0	0	1	1	0.93
13:52:06	672	217	242	4.6	0	181	138	-689	0	0	1	1	0.977
13:52:07	656	210	218	4.9	-1.4	181	137	-652	0	0	1	1	0.996
13:52:08	648	186	195	4.6	-1.1	180	136	-636	0	0	1	1	1.004
13:52:09	636	204	204	3.9	-1.1	180	137	-627	0	0	1	1	0.949
13:52:10	624	192	194	3.5	0	181	135	-622	0	0	1	1	0.949
13:52:11	612	183	184	2.8	1.1	181	136	-671	0	0	1	1	0.949
13:52:12	600	172	173	2.8	1.4	182	143	-630	0	0	1	1	1.004
13:52:13	588	166	169	2.1	-0.4	183	144	-550	0	0	0	1	0.996
13:52:14	580	153	161	1.1	1.1	184	146	<b>-528</b>	0	3.7	0	0	0.984
13:52:15	568	140	146	0.4	0	185	147	<b>-630</b>	0	3.9	0	0	0.852
13:52:16	556	128	133	0	-1.1	186	152	<b>-707</b>	0	2	0	0	0.957
13:52:17	540	114	119	0	1.8	186	149	<b>-732</b>	0	0	0	0	0.918
13:52:18	524	99	104	0.4	3.5	186	150	<b>-834</b>	0	0.2	0	0	0.879
13:52:19	508	83	87	1.1	2.8	187	148	<b>-959</b>	0	-0.8	0	0	0.918
13:52:20	496	66	71	0.7	0	187	146	<b>-1011</b>	0	4.1	0	0	1.004
13:52:21	480	48	53	0.4	0.4	187	145	<b>-1063</b>	0	-1.6	0	0	0.91
13:52:22	456	29	32	0.7	-0.7	187	142	<b>-1102</b>	-4.3	-0.9	0	0	0.949
13:52:23	428	8	11	3.2	-1.4	188	140	<b>-1057</b>	-1.8	-8.1	0	0	0.984
13:52:24	396	-2	-2	5.6	-1.4	189	134	-838	0.9	-5.4	0	0	1.16
13:52:25	420	-3	0	1.8	-1.4	189	131	59	-0.3	-4.5	0	0	0.563

DFDR reading at 0.125 Second interval is given below:

IST	Alt	RA 1	RA 2	Pitch	Roll	Head ing	IAS	Vert Spd	Pitch Comm Capt	Pitch Comm F/O	AP1	AP2	Vert Acc
13:52:20.000	496		71	0.4	-0.4								0.918
13:52:20.125								-1063					0.91
13:52:20.250				0.4			145		0	-1.6			0.898
13:52:20.375											0	0	0.93
13:52:20.500				0.4	0.4								0.949
13:52:20.625						187							0.965
13:52:20.750				<b>0.4</b>					<b>-1.2</b>	<b>-1.4</b>			<b>0.984</b>
13:52:20.875		48											0.984
13:52:21.000	480		53	0.7	-0.4								0.996
13:52:21.125								-1102					0.949
13:52:21.250				0.7			142		-4.3	-0.9			0.898
13:52:21.375											0	0	0.871
13:52:21.500				1.1	-0.7								0.871
13:52:21.625						187							0.879
13:52:21.750				1.4					-6.9	-1			0.918
13:52:21.875		29											0.965
13:52:22.000	456		32	2.5	-1.8								0.996
13:52:22.125								-1057					0.984
13:52:22.250				3.2			140		-1.8	-8.1			1.004
13:52:22.375											0	0	1.055
13:52:22.500				3.9	-1.4								1.082
13:52:22.625						188							1.082
13:52:22.750				4.9					-0.3	-8.3			1.102
13:52:22.875		8											1.141
13:52:23.000	428		11	5.3	-1.1								1.168
13:52:23.125								-838					1.16
13:52:23.250				5.6			134		0.9	-5.4			1.188
13:52:23.375											0	0	1.18
13:52:23.500				5.3	-1.4								1.57
13:52:23.625						189							2.137
13:52:23.750				<b>3.9</b>					<b>1.8</b>	<b>-8.2</b>			<b>3.129</b>
13:52:23.875		-2											2.051
13:52:24.000	396		-2	2.1	-1.1								0.938
13:52:24.125								59					0.563
13:52:24.250				1.8			131		-0.3	-4.5			0.648
13:52:24.375											0	0	0.391
13:52:24.500				2.1	-1.4								0.523

As per CVR recording, the approach briefing was carried out by crew before asking ATC for descent. The aircraft was cleared by ATC to descend to FL150, subsequently to FL110 and then to FL060. Both the crew discussed the weather developing around the Kolkata Airport and also the action to be taken in case of windshear. While giving landing clearance, the ATC tower informed the aircraft that there was rain over the airfield. Controls of the aircraft were with the First Officer (FO). FO asked PIC if he wanted to take-over the controls. No response from PIC was heard and FO remained continue with the controls. PIC noticed high rate of descent during final approach and advised the FO to correct it.

#### **1.12 WRECKAGE AND IMPACT INFORMATION:**

Aircraft landed safely on main landing gear. Pilot reported normal touchdown. However, heavy landing report was auto-generated. Aircraft remained on ground at Kolkata till 21.07.2016. Detailed inspection was carried out as per Heavy Landing inspection schedule. No damage to the aircraft was observed. On 21.07.2016 aircraft shifted to Delhi by ferry flight for further inspection. All the structural items were inspected and found satisfactory. Aircraft released for normal flying on 25.07.2015.

#### **1.13 MEDICAL AND PATHOLOGICAL INFORMATION:**

Both the crew were undergone pre-flight breath analyser check as per the provision of CAR Section 5 Series F Part III. No indication of alcohol consumption by any of the involved crew was observed during the check.

#### **1.14 FIRE:**

There was no pre/post incident fire.

#### **1.15 SURVIVAL ASPECTS:**

All the persons on-board the aircraft including 06 crew were safe.

### **1.16 TESTS AND RESEARCH:**

In view of autogenerated heavy landing report, DFDR and CVR data was downloaded and analysed by Airbus Industries. As per DFDR data, vertical acceleration was observed 3.129g at the time of touchdown against the manufacturer's limit 2.6g. This was classified as heavy landing.

As per heavy landing inspection schedule, inspection of main landing gear was carried out. Functional test of normal extension and retraction, and free-fall of the landing gear was performed and found satisfactory. Inspection of wing, flaps, fuselage, tail section, water tanks, avionics compartment, equipment/ furnishings was carried out and no damage was observed. Aircraft cleared for ferry flight to Delhi for additional inspections recommended by M/s Airbus. During special inspection, no damage/ crack were observed to the aircraft structure, landing gear assembly and attachments etc. Boroscopic inspection was carried out of both the engines and found satisfactory. Aircraft released for normal flying.

### **1.17 ORGANIZATIONAL AND MANAGEMENT INFORMATION:**

M/s Indigo is a scheduled airline operator with its main base at IGI Airport, New Delhi. It started its operation in 2006 with Airbus A-320 aircraft. It is operating Domestic and International sectors with a fleet of 100 aircraft. It is the largest low cost airline in India. The company is headed by a Chief Executive Officer.

### **1.18 ADDITIONAL INFORMATION:**

As per Para 6.1 (b) of CAR Section 8 Series F Part III, "*supervised take-off and landing shall not be permitted during actual monsoon/ adverse weather conditions.*" In view of above mentioned CAR, M/s Indigo Airlines has issued NOTAC No. 43BQ dated 09.07.2015, just 05 days before the incident. As per para 5 of the NOTAC, supervised take-off and landing shall not be permitted during adverse weather/ monsoon conditions, when the runway is wet or any time PIC feels conditions are marginal.

As per para 6 of NOTAC, The Pilot-in-Command shall ensure that during approach to land for a supervised landing, the aircraft is established on the



correct approach profile by 1000 feet above the aerodrome elevation. He shall also ensure that the aircraft is stabilised during approach at the correct approach speed and aligned with the runway center line and maintain a rate of descent within the specified limits for the type of aircraft and approach being made.

PIC was aware of the above mentioned conditions. At the time of contact with Kolkata ATC for landing clearance, the tower reported rain at the airport. In addition to this, he also noticed high rate of descent during landing and tried to give input on controls at last moment however, it was too late. He could not decide to take command on controls timely or to initiate Go-around.

First Officer was also aware about the monsoon flying conditions however, he was in confusion weather Examiner can allow him landing in actual conditions. After light drizzling encountered by the aircraft, FO asked PIC if he wanted to take-over the controls. PIC advised him to continue on controls and he will see later as per the conditions.

#### **1.19 USEFUL OR EFFECTIVE INVESTIGATION TECHNIQUES.**

Nil.

## **2. ANALYSIS:**

**2.1. Aircraft:** Aircraft had valid certificate of Airworthiness. Last C of A was issued on 09.01.2012 which was valid till 08.01.2017. All the inspections were carried out whenever due as per the approved schedules. Last major inspection of 750 Hrs/120 days was carried out at aircraft TSN 12176:37 Hrs on 09.07.2015. Last major inspection of 1200 Hrs of both the engines was carried out on 11.07.2015.

**2.2. Weather:** At the time of departure from Ranchi the weather at Kolkata indicated visibility 2800m in haze, wind direction/ speed 140/06 knots, broken clouds coverage at 10,000 ft with no significant change. A SPECI (Special Report) was issued at 13:45 IST by IMD which indicated TSRA (Thunderstorm/Rain) over the airport and overcast clouds coverage at 8000

ft. Visibility reduced to 2000m and further reduced to 600m at 14:00 IST. This indicates weather started deteriorating and visibility started reducing at the time of approach and landing.

**2.3. Flight Recorders:** As per CVR Recording the crew were aware of the weather developing around the Kolkata airport and discussed the action to be taken in case of windshear. Controls of the aircraft were with the First Officer (FO). FO asked PIC if he wanted to take-over the controls. No response from PIC was heard and FO remained continue with the controls. PIC noticed high rate of descent during final approach and advised the FO to correct it.

As per DFDR data, rate of descent (ROD) and pitch angle were normal upto 150 ft above the runway. After crossing 153 ft, ROD started increasing from 528 fpm and reached at 1057 fpm before touch down, which was very high. The aircraft touched down at 13:52 IST at a vertical speed of 838 fpm with high pitch of 5.6°. The maximum vertical acceleration recorded during landing was 3.129g against the structural limit 2.6g as specified by the manufacturer.

**2.4. Flight Crew:** Both the flight crew had sufficient flying experience. PIC was a DGCA approved Examiner and he had flown various types of aircraft as PIC. He had 18083:02 hrs of total flying experience out of which 13733:48 Hrs as PIC on Airbus 320 aircraft. He had flown about 3000 Hrs as instructor. He was not involved in any Accidents or Serious Incidents previously.

First Officer had total flying of 2617:27 Hrs including 2348:51 Hrs on A-320 aircraft as First Officer. Both crew had valid licenses. Both the crew were undergone pre-flight breath analyser test. FDTL of both the crew was within limit.

Both the crew were aware of DGCA regulations as well as organisation's guidelines for actual monsoon/ adverse weather conditions. They did not

follow the regulation and PIC permitted FO to continue to approach for landing during adverse weather conditions. PIC also noticed high sink rate during landing and advised FO to correct the same. However, timely action was not taken by the PIC.

### **3. CONCLUSIONS:**

#### **3.1. FINDINGS:**

1. Aircraft had valid Certificate of Airworthiness.
2. Both the crew had sufficient flying experience on the type of aircraft.
3. Both the crew had undergone Pre-Flight Breath Analyser test.
4. Flight Duty Time of both the crew was found to be within the limits.
5. Weather at Kolkata Airport since the time of departure from Ranchi to before descent at Kolkata Airport was reported above minima with no significant change.
6. A SPECI was issued 7 minutes before the touch down at Kolkata Airport.
7. SPECI indicated TSRA over the airfield.
8. The SPECI was not received by the flight crew.
9. Crew were aware of the weather developing over the airfield and also discussed action to be taken in case of windshear.
10. During final approach, radar advised the crew about rain over the airfield.
11. Aircraft Controls were with the First Officer under the supervision of PIC during the final approach.
12. Supervisory Take-off and Landing by First Officer under adverse weather conditions is not permitted as per CAR Section 8 Series F Part III.
13. The organisation had also issued guidelines for adverse weather operation in view of DGCA regulations.
14. Both the crew were aware of DGCA regulations as well as organisation's guidelines for operation during actual monsoon/ adverse weather conditions.

15. First Officer asked PIC whether he would like to take-over the controls. No response from PIC was heard.
16. Rate of descent (ROD) and pitch angle were normal upto 150 ft above the runway.
17. After crossing 153 ft, ROD started increasing from 528 fpm and reached at 1057 fpm before touch-down, which was very high.
18. PIC noticed high rate of descent and advised FO to correct it.
19. At last PIC also tried to give input to the controls. However, this could not arrest the high Rate of Descent.
20. The aircraft touched down at a vertical speed of 838 fpm with high pitch of 5.6°.
21. Vertical acceleration of the aircraft at the time of touch-down was 3.129g.
22. Structural limit specified by the manufacturer was 2.6g for touch-down.
23. Landing was classified as heavy landing.

### **3.2 PROBABLE CAUSES:**

Sudden changes in weather conditions and improper input by First officer resulted high Rate of Descent (ROD).

High ROD and delayed decision by the PIC to take-over the controls are the probable causes of the occurrence.

### **4. SAFETY RECOMMENDATIONS:**

Both the pilots may undergo corrective training.



(Rupinder Singh)

Assistant Director Air Safety

Place: New Delhi

Dated : 25.05.2017

## **ABBREVIATIONS USED IN THE REPORT**

AME	:	Aircraft Maintenance Engineer
ALW	:	All-up Landing Weight
ATC	:	Air Traffic Control
ATPL	:	Airline Transport Pilot License
AUW	:	All-up Weight
BKN	:	Broken Clouds
CAR	:	Civil Aviation Requirements
CB	:	Cumulonimbus Clouds
C.G.	:	Center of Gravity
CPL	:	Commercial Pilot License
CVR	:	Cockpit Voice Recorder
DGCA	:	Directorate General of Civil Aviation
DFDR	:	Digital Flight Data Recorder
DI	:	Daily Inspection
DVOR	:	Doppler VHF Omnidirectional Range
ELT	:	Emergency Locator Transmitter
FDR	:	Flight Data Recorder
FDTL	:	Flight Duty Time Limitations
FEW	:	Few clouds
FO	:	First Officer
HZ	:	Haze
IAS	:	Indicated Air Speed
ICAO	:	International Civil Aviation Organisation
ILS	:	Instrument Landing System
IMD	:	Indian Meteorological Department
IST	:	Indian Standard Time
LIZFW	:	Loaded Index at Zero Fuel Weight
LITOW	:	Loaded Index at Take-off Weight

NLG	:	Nose Landing Gear
NDB	:	Non Directional Beacon
NOSIG	:	No Significant Change
OVC	:	Overcast Cloud
PIC	:	Pilot-in-Command
POH	:	Pilot's Operating Handbook
QNH	:	Pressure Setting to Indicate Elevation
RA	:	Radio Altitude
ROD	:	Rate of Descent
RWY	:	Runway
SB	:	Service Bulletin
SCT	:	Scattered clouds
SKC	:	Sky Clear
SPECI	:	Special Report
TEMPO	:	Temporary
TSN	:	Time Since New
TSO	:	Time Since Overhaul
TSRA	:	Thunderstorm with Rain
UTC	:	Universal Time Coordinated
VHF	:	Very High Frequency
VOR	:	VHF Omni Range