सत्यमेव जयते

GOVERNMENT OF INDIA

CIVIL AVIATION DEPARTMENT

FINAL INVESTIGATION REPORT

INCIDENT TO M/s BH AIR AIRBUS A-319 AIRCRAFT LZ-AOA WHILE OPERATING SPICEJET FLIGHT No. SG-152 (MUMBAI-DELHI) ON 19-03-2016.

O/o Director Air Safety (NR), Safdarjung Airport, New Delhi – 110 003

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FOREWORD

This document has been prepared based upon the evidences available during the investigation, opinion obtained from the experts and examination of damaged components. The investigation has been carried out in accordance with Annex 13 to the convention on International Civil Aviation and under Rule 13(1) of the Aircraft (Investigation of Accidents and Incidents), Rules 2012.

The investigation is conducted not to apportion blame or to assess individual or collective responsibility. The sole objective is to draw lessons from this incident which may help to prevent such future incidents.

ABBREVIATIONS

Abbreviation	Expanded form
ABP	Able Bodied Persons
ACC	Area Control Centre
AGL	Above Ground Level
AMM	Aircraft Maintenance Manual
APP	Approach
ASDA	Accelerated Stop Distance Available.
ATC	Air Traffic Control
ATIS	Air Traffic Information System
A/C	Aircraft
CVR	Cockpit Voice Recorder
DFDR	Digital Flight Data Recorder
DGCA	Directorate General of Civil Aviation
ECAM	Electronic Centralised Aircraft Monitor
ENG	Engine
F/CTRL	Flight Control
FIN	Functional Identification Number
HZ	Haze (related to weather report)
HYD	Hydraulic
HYD G SYS LO PR	Hydraulic Green System Low Pressure
ICAO	International Civil Aviation Organisations
IFR	Instrument Flight Rules
IST	Indian Standard Time
KT	Knots
LDA	Landing Distance Available
LH	Left Hand
LPC-NG	An application software used for aircraft performance calculations.
MHz	Mega Hertz (unit of Frequency)
MLG	Main Landing Gear
MSN	Manufacturing Serial Number
QNH	Quasi Nautical Height (Height w.r.t sea level)
RADAR	Radio Detection and Ranging
RSR	Route Surveillance Radar

ABBREVIATIONS

RSVR	Reservoir
TAR	Terminal Approach Radar
TWR	Tower
RWY	Runway
TEMP	Temperature
TODA	Take Off Distance Available
TORA	Take Off Run Available
UN	United Nations (Organisation)
UTC	Coordinated Universal Time
VHF	Very High Frequency

Final Investigation Report on Incident of Emergency Landing to M/s BH Air's A-319 aircraft registration LZ-AOA, operating Flight No. SG-152 at Mumbai on 19.03.2016.

1	Aircraft	Type	Airbus A-319-112
		Nationality	Foreign (Bulgarian)
		Registration	LZ-AOA
2	Owner		M/s BH Air, Bulgaria.
	Operator		M/s Spicejet Pvt Ltd , India.
3	Pilot – in –Command		ATPL holder
	Extent of injuries		Nil
4	Date & Time of Incident		Date: 19.03.2016 Time : 0824 IST.
5	Place of Incident		Chhatrapati Shivaji International Airport, Mumbai.
6	Co-ordinates of Incident site		Latitude 19 ° 05 ' 30 " N. Longitude 072 ° 51 ' 58 " E.
7	Last point of Departure		Chhatrapati Shivaji International Airport, Mumbai.
8	Intended place of landing		Indira Gandhi International Airport, New Delhi.
9	No. of Passengers on board		150 passengers and 02 infants
10	Type of Operation		Commercial Air Transport Revenue Operations Passenger; Scheduled Flight.
11	Phase of Operation		Initial Climb
12	Type of Incident		SCF-NP: System/component failure or malfunction [non-power plant]

(All timings in the report are in IST)

SYNOPSIS:

Indian operator M/s Spicejet Pvt. Ltd had hired Airbus A-319 aircraft LZ-AOA on 'wet-lease' basis from a Bulgarian operator named M/s BH Air. The said aircraft was operating Spicejet flight No. SG-152 (sector Mumbai-Delhi) on 19.03.2016. The aircraft got airborne from Mumbai Airport at 0752 IST and made an emergency landing at 0824 IST. There were 150 passengers and 02 infants , 02 flight crew members and 04 cabin crew members on board the aircraft. There was no injury to any passengers, flight crew or cabin crew members on board the aircraft. There was no damage to the aircraft or any out side object.

The Director General of Civil Aviation has instituted investigation into the incident to investigate the cause of the emergency landing incident by appointing inquiry officer vide order No. AV.15019/15/2016-AS dated 07.04.2016 under Rule 13(1) of Aircraft (Investigation of Accidents and Incidents), Rules 2012. It is found during investigation that there was loss of hydraulic fluid from the damaged flexible hose of LH main landing gear door actuator which caused failure of Green hydraulic system. Failure of Green hydraulic system, in turn, led to the emergency landing of the aircraft.Yellow hydraulic system was recovered by the pilot during final approach to land.

1. FACTUAL INFORMATION:

1.1 History of Flight:

1.1.1. Indian operator M/s Spicejet Pvt. Ltd had hiredan Airbus A-319 aircraft on 'wet-lease' basis from a Bulgarian operator named M/s BH Air. Registration marks of the aircraft were LZ-AOA. The aircraft was operating Spicejet flight No. SG-152 (Mumbai-Delhi) on 19.03.2016. The aircraft departed from Mumbai at 0735 IST. There were 150 passengers,02 infants, 02 flight crew members and 04 cabin crew members on board the aircraft.The 02 flight crew and 04 cabin crew of M/s BH Air were of Bulgarian nationality. Passengers also included 02 cabin crew of M/s Spicejet of Bombardier (DHC) Q-400 aircraft fleet. The M/s Spicejet cabin crew members were there for aid of cabin crew members of M/s BH Air.

1.1.2. The aircraft got airborne at 0752 IST and was climbing after take-off. While climbing through 4000 feet (approx.), the flight crew got ECAM caution as follows:-

" HYD G ENG 1 PUMP LO PR". While the flight crew initiated ECAM actions, following ECAM cautions appeared :-

HYD G SYS LO PR

F/CTRL FLAPS FAULT

HYD Y RSVR OVHT (with all necessary actions)

HYD G RSVR LO LVL,

HYD G+ Y LO PR

The above ECAM cautions indicated dual failure of 'Green' and 'Yellow' hydraulic systems in the aircraft. After failure of two hydraulic systems, the flight crew declared emergency and decided to return to Mumbai. The Senior Cabin Crew member was called in the cockpit by the Pilot- in –Command and briefed about the emergency and was asked to prepare the cabin for emergency landing in next 10 minutes.

1.1.3. The Senior Cabin Crew came out of the cockpit and carried out briefing for other cabin crew members about the emergency situation. Thereafter, she made announcement in the cabin for passengers about the ensuing emergency. Passenger safety demonstrations were carried by cabin crew members. A cabin crew member of M/s Spicejet was translating the instructions of safety demonstrations in Hindi. When safety demonstration for life-jackets was being carried out, some passengers put on their life-jackets. It was followed by other passengers. Some passengers inflated their life-jackets. When the sound of inflating life- jackets was heard by the Senior Cabin Crew member, she announced twice via PA system, "DO NOT INFLATE LIFE JACKETS". The other cabin crew members were also trying to stop passengers from inflating life-jackets and explained them that the later should wait for a 'command' for inflating life-jackets; but due to stressful situation nobody was listening.

1.1.4. After completion of safety demonstrations, the cabin crew provided 02 baby life-jackets for 02 infants and then provided safety instructions to able bodied persons (ABP) seated near over wing exits (OWE) and main door exits. The Senior Cabin Crew member carried out a final check of the cabin and then went to forward galley. After obtaining inputs from other cabin crew members, she intimated to cockpit that cabin was 'secured'. Thereafter, the cabin crew members removed their scarves and sharp objects, took positions and prepared themselves for emergency landing.

1.1.5. On receiving 'cabin secured' confirmation from the Senior Cabin Crew member, the 'pilot-in-command' took controls of the aircraft and the 'first officer' became pilot monitoring (PM). The aircraft was left with only 'Blue' hydraulic system to be used during landing. The first officer performed all required calculations for landing using LPC-NG, a kind of application software provided by M/s Airbus Industrie for aircraft performance related calculations. The 'pilot-in-command' (PIC) performed a 'free fall' landing gear extension successfully and made an approach for Mumbai runway 27 and descended till 1000 feet (approx.) above ground level. Then he switched 'ON' the' yellow' electric pump again as a 'last trial' to achieve a better landing performance. The yellow hydraulic system was recovered and the aircraft landed safely on Mumbai airport on runway 27 at 0824 IST. The aircraft was towed to bay and parked. All passengers disembarked. There was no injury to any passengers or any crew member on board the aircraft.

1.1.6. The incident occurred at Mumbai Airport whose geographical co-ordinates are : Latitude 19 ° 05 ' 30 " North ; and Longitude 072 ° 51 ' 58 " East. The incident occurred in the morning of 19.03.2016 at 0824 IST.

1.2 **Injuries to Persons** :

Injuries	Crew	Passengers	Others
Fatal	Nil	Nil	Nil
Serious	Nil	Nil	Nil
Minor	Nil	Nil	Nil
None	6	150+2	Nil

1.3 **Damage to Aircraft**: There was no damage to the aircraft.

1.4 **Other Damages:** There was no other damage.

1.5 **Personnel Information:**

1.5.1 Pilot- in- Command

*AGE : (information not available) Sex: Male.

1.5.2. First Officer (Co-Pilot) :

*AGE : (information not available) Sex: Male.

1.5.3. Senior Cabin Crew :

*AGE : (information not available) Sex:Female.

[* The crew members belonged to M/s BH Air, based in Bulgaria. Age, qualification and flying experience related information was not available. The above information is required to be maintained with the operator i.e M/s Spicejet Pvt Ltd. as per provisions of CAR Section 3 Series C Part I , Para 8 (VIII), (IX) and (X)].

1.6 Aircraft Information**:

1.6.1 **Airframe** :It was an Airbus A-319-112 aircraft. Its manufacturing serial number (MSN) was 3139. It was manufactured by Airbus, France. The aircraft was manufactured in the year 2007. It was registered under Bulgarian Civil Aviation Authority as LZ-AOA. The aircraft had completed a total time of 17031 : 45 hours and 9146 cycles since new. Passenger seating capacity of the aircraft is 150. The aircraft is fitted with tricycle type of landing gear.

1.6.2. **Engine**: The aircraft was fitted with two CFM56-5B5/3 engines.

1.6.3. **Performance :** The aircraft took-off normally and was climbing for its cruise level. During its climb through the altitude of 4000 feet, the 'Green' hydraulic system failure occurred followed by 'Yellow' hydraulic system failure. The aircraft climbed up to flight level 150. Thereafter the climb was stopped by the pilot and decision was taken to return to Mumbai due failure of both Green and Yellow hydraulic system. The aircraft returned and landed safely. Thus, performance of the aircraft was satisfactory. Mass and centre of gravity were within limits.

1.6.4. **Prior Snag :** Information about snag pending on the aircraft or similar snag occurred in the recent past on the aircraft was not available.

1.6.5. **Fault Confirmation:** On ground, during post flight checks, hydraulic leak was observed at LH MLG Door Actuator Hose Assembly (FIN 2766GM, IPC 32-31-03-18E-020A). Hose Assembly reference no. 2766GM was found damaged and pierced in the flexible area closer to the union threads. Fault was confirmed on ground and failure of 'Green Hydraulic System' was caused due hydraulic fluid leak from 'Hose Assembly' (FIN 2766 GM). Hose Assembly (FIN 2766 GM) was replaced. Green Hydraulic system was serviced after high loss of hydraulic fluid. 'Yellow Hydraulic System' reservoir fault could not be confirmed on ground. An operational test was performed on 'Yellow Hydraulic System' and was found satisfactory. An operational test was performed on 'Green Hydraulic System' and it was found satisfactory. Landing gears were subjected to free-fall extension and was satisfactory. After free-fall extension, landing gear system was put in to normal mode. The aircraft was released to service.

[** : Very limited aircraft information was available.]

1.6.6. **Type of Fuel**: Aviation Turbine Fuel (Jet A1) was the type of fuel used in this aircraft.

1.7 Meteorological Information:

Meteorological Information issued at Mumbai Airport between 0700 IST and 0830 IST is given below:

1.7.1. Meteorological Report at 0700 IST :
SPECI VABB 190130Z 33004KT 3000 HZ NSC 27/23 Q1011 NOSIG=

[Wind 330 degrees/04 knots, visibility 3000 meters with haze, no significant cloud, Temperature 27° C, Dew point 23° C, QNH 1011, No significant trend] .

1.7.2. Meteorological Report at 0730 IST :

METAR VABB 190200Z 02005KT 3000 HZ NSC 28/23 Q1011 NOSIG=

[Wind 20 degrees/05 knots, visibility 3000 meters with haze, no significant cloud, Temperature 28° C, Dew point 23° C, QNH 1011, No significant trend] .

1.7.3. Meteorological Report at 0800 IST :

METAR VABB 190230Z VRB03KT 2500 HZ NSC 28/22 Q1012 NOSIG=

[Wind variable /03 knots, visibility 2500 metres with haze, no significant cloud, Temperature 28° C, Dew point 22° C, QNH 1012, No significant trend] .

1.7.4. Meteorological Report at 0830 IST :

METAR VABB 190300Z 11004KT 2500 HZ NSC 28/21 Q1012 NOSIG=

[Wind 110 degrees/04 knots, visibility 2500 meters with haze, no significant cloud, Temperature 28° C, Dew point 21° C, QNH 1012, No significant trend] .

1.7.5. It was morning (local) of 19.03.2016 when the aircraft departed from Mumbai at 0752 IST . There was no rain and the runway surface was dry during departure as well as during emergency landing of the aircraft at Mumbai at 0824 IST.

1.8 Aids to Navigation:

Navigation aids available to the aircraft were RADAR with VHF communication link (Route Surveillance RADAR), VOR, NDB and ILS. The airborne navigation equipment in the aircraft were effective in providing guidance to the pilot.

1.9. Communication:

The aircraft was equipped with two VHF communication sets. It was continuously in contact with Mumbai ATC before departure, after departure and during its return for emergency landing. Two way communication between aircraft and Mumbai ATC was never lost and it was always there.

1.10. Aerodrome Information:

Mumbai Airport has two runways which are not parallel. The runway designations are 09/27 and 14/32. The highest elevation of the airport is 11.5 meters. The runway surface is made of asphalt. The reference temperature is 33°C.

RWY Designation	TORA (M)	TODA (M)	ASDA (M)	LDA (M)	RESA
09	3187	3187	3187	3045	240M X 100M
27	3448	3448	3448	2965	240M X 100M
14	2871	2871	2871	2471	55 M X 90 M
32	2871	2871	2871	2871	150M X 100 M

The aerodrome remains operational for 24 hours on daily basis throughout the year. It maintains fire-fighting category 10. Each runway is provided with PAPI. Runway 27 is equipped with category II ILS. Runways 09 and 14 are provided with category I ILS. Runway 32 is provided with simple approach lights. The aerodrome is equipped with RADAR for surveillance and navigation as well. DVOR and DME are also installed at the aerodrome as aids for aircraft navigation. The ATC is equipped with VHF frequencies for two way communication with the aircraft. VHF frequencies used by different ATC units are given below:-

VHF frequencies used by different ATC Units at Mumbai Airport

Service designation	Call sign	Frequency	Hours of operation	Remarks
1	2	3	4	5
TAR	Mumbai Radar	119.3 MHZ 127.9 MHZ	H24	Standby Frequency -----
SEARCH AND RESCUE	-	123.1 MHZ	H24	-----
APP	Mumbai Approach	119.3 MHZ 120.35 MHZ 127.9 MHZ	H24 H24 H24	-------- Standby Frequency ------
TWR	Mumbai Tower	118.1 MHZ 122.5 MHZ	H24 H24	----- Standby Frequency
ATIS	Mumbai information	126.4 MHZ	H24	-----
ACC FEEDER	---	133.3 MHZ 133.85 MHZ	H24 H24	----- Standby Frequency
EMERGENCY FREQUENCY	----	121.5 MHZ	H24	-----
ACC / RSR (S)	Mumbai Control / Radar	120.5 MHZ 125.35 MHZ	H24 H24	Standby Frequency -----
CLEARENCE DELIVERY	Mumbai Delivery	121.85 MHZ	H24	-----
ACC / RSR (N)	Mumbai Control / Radar	120.5 MHZ 132.7 MHZ	H24 H24	Standby Frequency -----
SMC	Mumbai Ground	121.75 MHZ 121.85 MHZ 121.9 MHZ	H24 H24 H24	----- ----- -----

1.11 Flight Recorders :

The aircraft is equipped with CVR and DFDR. The flight data were not available. However, the snags were also reported by ECAM system and relevant information about snag was available for snag analysis by aircraft maintenance engineers.

1.12 Wreckage & Impact Information : The aircraft landed safely and there was no impact. Also there was no wreckage.

1.13 Medical & Pathological Information:

There was no incapacitation of any of the flying crew members or cabin crew members. Also there was no incapacitation or injury to any passenger.

1.14 Fire: There was no fire.

1.15 Survival Aspects: The aircraft returned due to failure of both Green and Yellow Hydraulic Systems and made approach for an emergency landing. During approach, yellow system was recovered by the pilot and landing was smooth and safe. The aircraft was towed to bay and passengers disembarked normally with their hand baggages. No evacuation was required. The incident was survivable.

1.16 Test and Research: Nil.

1.17. Organizational & Management Information:

1.17.1. M/s BH Air has its principle base of aircraft operations in Bulgaria. The A-319 aircraft LZ-AOA was registered under the Civil Aviation Authority of Bulgaria. Bulgaria is also a member country of ICAO, UN. Thus, Standards and Recommended Practices of ICAO are applicable to them. The above mentioned organisation had entered in to a 'wet lease' agreement with M/s Spicejet Pvt. Ltd (an Indian air transport scheduled operator) for providing scheduled air transport services on domestic sectors in India. The Wet Lease

period was initially valid from 16.07.2015 to 15.01.2016; which was further extended till 31.05.2016. The date of incident is covered under wet lease period.

1.18. Additional Information:

1.18.1. With respect to lease of a foreign registered aircraft by an Indian operator, relevant provisions contained in CAR Section 3 Series C Part 8 (VIII) are quoted below:

" The maintenance programme and the Operations Manual as approved by DGCA for the Indian operator shall be applicable for maintenance and operation of the wet leased aircraft with suitable adaptations for the type of aircraft, if necessary."

1.18.2. Provision of CAR Section 3 Series C Part 8 (IX) are quoted below:

"The flight crew and the maintenance personnel shall also follow the instructions of the Indian operator as well as those issued by the Indian DGCA. The non-compliant personnel shall be liable to be debarred from operating or maintaining the wet leased aircraft in India."

1.18.3. Provision of CAR Section 3 Series C Part 8 (X) are quoted below:

"The Indian operator shall give thorough briefing to the foreign crew, about the Indian rules and regulations, standard departure and arrival procedures at Indian airports, standard operating procedures, prohibited areas and precautions to be exercised while operating at various airports in India. The operator shall also maintain operational and flight records of the foreign crew to ensure that the FDTL are adhered to and their licenses/ medical fitness and proficiency checks are all current."

1.18.4. Further, the Director General of Civil Aviation had issued an 'Authorisation for Wet Lease Operations' dated 16.10.2015 to M/s Spicejet Pvt. Ltd. against its AOP No. S-16, which inter alia contained 'Operating Conditions' for the aircraft on wet lease from M/s BH Air (lessor of the aircraft). Para 4 of the above mentioned authorisation is quoted below:

" The operator shall also maintain operational and flight records of the foreign crew to ensure the FDTL are adhered to and their licenses/ medical fitness and proficiency checks are all current. A confirmation to this effect will be submitted by the operator to DGCA."

Para 8 of the above mentioned authorisation is quoted below:

" The operations conducted under the Operational Control of the Lessor shall be monitored by the Indian Operator who shall also ensure compliance of applicable Indian Rules/Regulations."

1.18.5. The owner of the aircraft i.e. M/s BH Air provided very limited information to M/s Spicejet about the incident, that too after several attempt by the later. The information provided by M/s BH Air was insufficient for investigation of the incident. M/s BH Air did not respond to those requests of M/s Spicejet which were made beyond the date of validity of 'wet lease' period for obtaining incident related data. The 'wet lease' period was valid up to 31.05.2016. It was not known why M/s BH Air did not respond to the request of M/s Spicejet.

1.19. Useful and Effective Techniques: Nil.

2. ANALYSIS:

2.1. System failure in the aircraft: The pilot saw the Green Hydraulic System failure message in ECAM window when the aircraft was climbing and passing 4000 feet. While the pilot began to carry out ECAM action with respect to the failure of Green Hydraulic System, Yellow Hydraulic System failure also occurred. Green and Yellow hydraulic system together supply to all aircraft controls and systems required for take-off and landing and vital for safety of aircraft operations. After failure of both the hydraulic systems, the pilot declared emergency and returned to Mumbai for emergency landing. When the aircraft was on final approach, the yellow hydraulic system was recovered by the pilot. Failure of the Yellow Hydraulic System was temporary. However, after recovery of Yellow Hydraulic System the pilot did not decide in favour of continuing the flight and continued approach for emergency landing. The aircraft made an emergency landing which was safe. Therefore, failure of Green Hydraulic System and Yellow Hydraulic System was a causal factor for return and emergency landing of the aircraft. Failure of Yellow Hydraulic System had heightened the emergency. The snag of Green Hydraulic System was confirmed on ground. A hydraulic flexible hose of LH MLG door

actuator was found damaged and pierced near its union thread and hydraulic fluid leaked from it. Loss of hydraulic fluid and consequent failure of Green Hydraulic system was attributed to this damaged and leaking flexible hose. The damaged flexible hose was replaced during rectification of the snag. Yellow hydraulic reservoir overheat fault could not be confirmed on ground.

2.2. Weather: On 19.03.2016, the aircraft was airborne at 0752 IST from Mumbai and returned to make emergency landing at 0824 IST. As per meteorological reports of Mumbai Airport obtained between 0730 IST and 0830 IST dated 19.03.2016; weather was calm. Visibility was between 2500 meters to 3000 meters with haze. There were no significant clouds. There was no rain or thunder showers between the time shown above. Runway surface condition was dry. Meteorological reports did not show any significant change in trend of the prevailing weather. Weather was conducive for operations under Instrument Flight Rules (IFR). Weather was not a contributory factor to the incident.

2.3. Pilot Handling of the Aircraft: The aircraft got airborne at 0752 IST and climbed normally. When the aircraft was climbing and passing 4000 feet, 'Green' Hydraulic System failure occurred. The pilot began to carry out ECAM action in respect of the above mentioned failure and the aircraft continued to climb. This was followed by failure of 'Yellow' Hydraulic System. On failure of both the hydraulic systems, the pilot declared emergency and informed Mumbai ATC about his decision to return. Purser (Cabin Crew in-charge) was called in the cockpit by the pilot and was briefed about the impending emergency and was asked to prepare the cabin in next 10 minutes for emergency landing at Mumbai. Meanwhile, when the aircraft was approaching for landing and was at 1000 feet above ground level (AGL), the pilot tried to recover the 'yellow' hydraulic system. The recovery attempt was successful and 'yellow' hydraulic system became functional. After obtaining clearance from Cabin Crew in-charge about 'cabin readiness', the pilot landed the aircraft smoothly and safely. The aircraft was then towed to bay and passengers disembarked with their hand baggages. No evacuation was required. Thus, handling of the aircraft by pilot was satisfactory and decision to return for emergency landing after failure of both 'Green and Yellow Hydraulic Systems' was justified. Handling of aircraft by the pilot was not a contributory factor to the incident.

2.4. Action of Cabin Crew: After being briefed by the pilot about the impending emergency, the 'cabin crew in-charge' in turn, briefed other cabin crew for preparation of the cabin. Safety

demonstration for passengers was carried out by the cabin crew. She also made announcement that passengers should put on their 'life-jacket' but not to inflate. Two 'baby life-jackets' were also provided and 'cabin ready' clearance was conveyed to the pilot. Following her announcement, passengers put on their life- jackets; and some passengers inflated their life jackets. Cabin crews repeatedly asked passengers not to inflate the 'life-jackets' and prevented others from doing the same. Announcements were also translated in Hindi for convenience of the passengers. However, some passengers had already inflated their 'life- jackets' due stressful situation in cabin caused by emergency landing of the aircraft. Action on the part of the cabin crew was satisfactory.

2.5. Inappropriate information sharing between the lessor and the lessee : Provisions of CAR Section 3 Series C Part I , Para 8 (VIII) , (IX) and (X) are applicable to foreign registered aircraft on 'wet lease' by an Indian operator. The provisions were also reiterated in the 'Authorisation for Wet Lease Operations' dated 16.10.2015 issued to the operator. As per the provisions, the approved Maintenance Programme and Operations Manual of Indian operator (the lessee) were applicable to the wet leased aircraft for its maintenance and operations with suitable adaptations. As per regulations, the operator was required to maintain operational and flight records of the foreign crew to ensure that the FDTL are adhered to and their licenses/ medical fitness and proficiency checks are all current. However, it is found that the operator (the lessee) has not maintained detailed information w.r.t. maintenance and operations of the 'wet leased' aircraft. It was also found that M/s BH Air (the lessor) did not share all 'operations and maintenance data' with M/s Spicejet (the lessee) in letter and spirit of the 'Authorisation for Wet Lease Operations' date 16.10.2015 issued by DGCA. This has resulted in loss of vital information like past maintenance history of the aircraft , pending snag on the aircraft; and age, recency, currency, medical fitness and FDTL of the flight crew. Availability of the same could have aided to this investigation. It is inferred that information sharing between the lessor and the lessee about 'operations and maintenance' was not efficient. In view of the shortcoming discussed above, a mechanism of information sharing is required to be put in place for sharing and updation of complete information on 'operations and maintenance' of the leased aircraft. Further, the lessor did not respond to the requests of lessee seeking 'incident information' that were made after the date of validity of the 'wet lease' period.

2.6. Circumstances Leading to the incident: The 'Green Hydraulic System' failed when the aircraft was climbing after 'take-off' and passing 4000 feet. This was followed by failure of 'Yellow Hydraulic System'. On failure of both the hydraulic systems, the pilot declared emergency and decided to return to Mumbai for an emergency landing. The cabin was also prepared simultaneously for the emergency landing. The flight crew and cabin crew were all of Bulgarian nationality whereas majority of passengers were Indians. The 'cabin crew in-charge' announced for passengers to put on their 'life-jacket' but not to inflate it. Safety instructions were also translated in Hindi by on board Spicejet cabin crew. However, some passengers inflated the 'life–jacket' despite prohibitive instructions from cabin crew members. Passengers might have done so in stressful situation. During final approach, the 'yellow hydraulic system' was recovered. However, the aircraft continued approach for landing. The landing of the aircraft was smooth and safe. The aircraft made emergency landing due failure of Green Hydraulic System. Failure of 'Yellow Hydraulic System' could not be confirmed on ground. Some passengers inflated their 'life-jackets' due stress caused by an emergency situation.

3. CONCLUSION:

3.1. Findings:

3.1.1 M/s BH Air A-319 aircraft was registered under Civil Aviation Authority of Bulgaria; and was flying on domestic sectors for M/s Spicejet under 'Wet Lease' agreement. The wet lease agreement was valid on the day of the incident.

3.1.2. Bulgaria is a member state of International Civil Aviation Organisation(ICAO) under United Nations Organisations. The Standards and Recommended Practices of ICAO are applicable to them.

3.1.3. The flight crew and cabin crew members were all of Bulgarian nationality.

3.1.4. Weather was not a contributory factor to the incident.

3.1.5. Failure of Green hydraulic system followed by failure of Yellow hydraulic system led to emergency landing of the aircraft. Failure of Yellow hydraulic system heightened the emergency.

3.1.6. Yellow hydraulic system was recovered during final approach. Fault on 'Yellow' hydraulic system could not be confirmed on ground.

3.1.7. The snag of Green hydraulic system was confirmed on the ground. The 'LH Main Landing Gear Door Actuator flexible hose' was found damaged and pierced in the area near its union threads. Hydraulic fluid was found leaking from the damaged flexible hose.

3.1.8. Failure of Green Hydraulic System occurred due leak in LH Main Landing Gear Door Actuator flexible hose. The damaged flexible hose was replaced as per appropriate AMM Task.

3.1.9. Handling of the aircraft by the pilot was satisfactory.

3.1.10. Some passengers inflated their 'life-jackets' despite prohibitive instructions from the cabin crew. All cabin crew managed to prevent other passengers from inflating their 'life-jackets'.

3.1.11. Action on the part of cabin crew was satisfactory

3.1.12. Situation in cabin was stressful and was caused by the impending emergency landing.

3.1.13. No emergency evacuation was required. Passengers disembarked with their hand baggages.

3.1.14. As per CAR Section 3 Series C Part I , Para 8 (VIII) , (IX) and (X), the operator (the lessee) was required to maintain a detailed 'maintenance and operational information'. The regulations were also reiterated in 'Authorisation for Wet Lease Operations' issued to the operator. However, the operator (the lessee) could not comply with above regulations.

3.1.15. M/s BH Air (the lessor) did not respond to the request of M/s Spicejet (the lessee) for 'incident information' that were made after the validity of the 'wet lease period'.

3.2. Probable cause of the incident:

Failure of the Green Hydraulic System due loss of hydraulic fluid from the damaged 'LH MLG door actuator flexible hose' caused emergency landing of the aircraft. Failure of Yellow Hydraulic System could not be confirmed on ground.

4. SAFETY RECOMMENDATIONS :

Provision should be made in DGCA Regulations to ensure that the lessor must provide 'aircraft incident/ accident information' to the lessee whenever required for incident investigation.

(HN Mishra)
Deputy Director of Air Safety & Inquiry Officer, LZ-AOA.

Place: New Delhi.
Date : 19.11.2016

Photograph of 'LH Main Landing Gear Door Actuator Hose Assembly' (FIN 2766GM, IPC 32-31-03-18E-020A) of A-319 aircraft LZ-AOA.

LH MLG Door Actuator Flexible Hose damaged near union from which hydraulic fluid leaked