FINAL INVESTIGATION REPORT OF ACCIDENT TO PAWAN HANS LTD. DAUPHIN AS 365 N HELICOPTER VT-ELJ AT MELURI ON 24/11/2015

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Member

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Chairman

Foreword

This document has been prepared based upon the evidences collected during the investigation, opinion obtained from the experts. The investigation has been carried out in accordance with Annex 13 to the convention on International Civil Aviation and under the Rule 11 of Aircraft (Investigation of Accidents and Incidents), Rules 2012 of India. 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 accidents or incidents.

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1. Helicopter Type	: Dauphin AS 365 N
Nationality	: INDIAN
Registration	: VT - ELJ
2. Owner/ Operator	: Pawan Hans Helicopter Ltd.
3. Pilot – in –Command	: Holder of CHPL
Extent of injuries	: Serious
4. Co-Pilot	: Holder of CHPL
Extent of injuries	: Serious
5. Place of Accident	: Meluri
6. Co-ordinates of Accident Site	: 25 41’ 00” N/ 94 38’ 00” E
7. Last point of Departure	: MON Helipad
8. Intended place of Landing	: Meluri
9. Date & Time of Accident	: 24th Nov 2015; 05:30 UTC (Approx.)
10. Passengers on Board	: 04
Extent of Injuries	: Minor
11. Phase of Operation	: Landing
12. Type of Accident	: Main Rotor Blades hit obstacle during Go-Around

(ALL TIMINGS IN THE REPORT ARE IN UTC)

SUMMARY:

M/s Pawan Hans Dauphin N helicopter VT-ELJ was involved in an accident while operating flight from Dimapur to Meluri helipad, Nagaland on 24.11.2015. There were four passengers on board the helicopter with 02 crew members.

On 24.11.2015, the helicopter VT-ELJ was schedule to operate flight Dimapur-Kohima-Mon-Meluri-Kohima. The flight from Dimapur to Mon helipad was uneventful. Helicopter took off from "Mon Helipad" at approx 04:55 UTC for Melluri Helipad. The flight up to approach of Melluri helipad was uneventful. The Pilot approached for beginning of the helipad, however, as he entered the area around helipad maintaining height of 5-6 feet above the ground, due to the rotor downwash, a huge dust bowl engulfed the helicopter. The visibility of the Pilot was reduced totally due to the dust bowl.

Pilot got disoriented and decided to abort the landing and initiated go around from hover. During the process of go-around, the main rotor blade and subsequently nose of the helicopter hit the 30 feet high hillock in the forward path of the helicopter and toppled on its left. The impact caused post impact fire in the aft cabin, engine compartment and front tail boom area. All the six persons on board including both crews were rescued and taken to Hospital at Kohima for medical treatment after the accident.

The Ministry of Civil Aviation constituted a Committee of Inquiry to investigate the cause of the accident under Rule 11 of Aircraft (Investigation of Accidents and Incidents) Rules 2012 comprising of Sh. A X Joseph as Chairman with Sh. Raje Bhatnagar and Capt. P K Chabri as members.

1. FACTUAL INFORMATION.

1.1 History of the flight

M/s Pawan Hans Dauphin N helicopter VT-ELJ was involved in an accident while operating flight from Dimapur to Meluri Helipad, Nagaland on 24.11.2015. The Nagaland State Government helicopter operations are leased to M/s Pawan Hans Ltd. The Flight was under the command of Pilot holding valid CHPL along with Co-Pilot also holding valid CHPL. Both the operating crew were duly qualified to operate the flight. There were four passengers on board the helicopter.

On 24.11.2015, the helicopter VT-ELJ was planned to operate flight Dimapur-Kohima-Mon-Meluri-Kohima. On 18.11.2015, the Nagaland State Transport scheduled the flight for the sector Dimapur-Kohima-Mon-Meluri-Kohima. The information was relayed through letter to Pawan Hans and also to the Yard Master, Meluri for information and to take necessary actions for helipad. The entire helicopter operations was under VFR Rules. The helicopter departed from Dimapur at 0252 UTC for "Mon Helipad" which is 84 NM from Dimapur. After takeoff, helicopter changed over to Jorhat ATC beyond 10 NM from Dimapur at 0302 UTC. The helicopter landed at Mon helipad at 0330 IST. The flight from Dimapur to Mon helipad was uneventful.

Thereafter the helicopter took off from "Mon Helipad" at approx 0455 UTC for Melluri Helipad. Meluri is approximately 48 nautical miles at 107 radial from Dimapur, Nagaland. The planned route from Mon to Meluri was Mon-Tuensand-Kiphre-Melluri. The flight upto approach was uneventful. As per PIC, he had sighted the helipad with "H" mark on it clearly during approach. The PIC also stated that, while approaching the helipad, he observed that in the regular approach direction i.e. bearing 110/290 of the helipad vehicles were parked on the road leading to helipad and also there were lot of people gathered close to

the vehicles. Due to this he decided to make a straight in approach for Meluri Helipad from bearing 150-160, as the approach funnel was free from obstructions. The PIC also mentioned that there was sufficient reserve power and helipad was clearly visible. The approach was planned for beginning of the helipad so that helicopter can land by the center of the helipad. However, when the helicopter was at around 25-30 ft away from the helipad at around 5 feet altitude, a small intensity dust from the hard ground (area well outside the helipad) was observed. The PIC also stated that he decided to continue with approach as the helipad was clearly visible and a normal approach terminated into hover as the helicopter was in the transition phase of the flight and was committed to land.

The PIC further mentioned, that as he entered the area around helipad maintaining about 5 to 6 feet above the ground, due to the rotor downwash, a huge dust bowl engulfed the helicopter with the presence of loose mud and gravels around the helipad. The visibility was reduced totally due to the dust bowl and he lost all visual contact with the ground/ obstructions.

The PIC got disoriented and decided to abort the landing and initiated go around from hover with no visual contact with the ground/ obstructions. During the process of go-around, the main rotor blade and subsequently nose of the helicopter hit the approx 30 feet high hillock ahead of his path in the south direction at a distance of about 45 meters from the "H" mark of the helipad. As the speed of the helicopter was low, the helicopter toppled on its left causing post impact fire in the aft cabin, engine compartment and front tail boom area.

PIC further mentioned that, after the accident he felt unconscious and after regaining consciousness he found himself injured and the Co-Pilot was trapped between the instrument panel and seat and was also injured.

The State Government had made no arrangements of firefighting and first aid at the helipad prior to the operation of the flight. The last operation on this helipad by a Civil helicopter was on 28.06.2015.

Additional Deputy Commissioner of Nagaland Government was present at the Helipad to receive the on board passengers. He mobilized the local residents and available crowd to rescue the personals on board. The locals used household implements and water resources to douse the fire and rescued the passengers. PIC came out of the helicopter after accident. All the six persons on board including crew were rescued and taken to Hospital at Kohima for the basic treatment and subsequently discharged.

1.2 Injuries to persons.

INJURIES	**CREW**	**PASSENGERS**	**OTHERS**
FATAL	Nil	Nil	Nil
SERIOUS	02	Nil	NIL
MINOR	Nil	04	----

During the accident both the cockpit crew sustained serious injuries.

Pilot in Command:

- Severe compression in Spine
- Injuries in forehead and knees
- Pilot had gone for his medical exam at IAM Bangalore on 05th Jan 2016 and was declared medically unfit for six months.
- Once again, the PIC had gone for review medical on 11th July 2016 and again he was declared medically unfit for six more months i.e. till 10th Jan 2017.

Co-Pilot

- Multiple facial fracture. He was operated for facial reconstruction on 27th Nov 2015 and had two plates still fitted for support and healing.
- Co-Pilot had gone for his medical exam at AFCME, New Delhi on 07th Jan 2016 and was declared medically unfit for 08 weeks.
- Once again, the Co-Pilot had gone for review medical on 14th March 2016 and 14th June 2016 and again he was declared medically unfit till 16th Sep 2016 pending his next review.

As both the cockpit crew sustained, serious injuries the alcohol test post accident was not carried out.

1.3 Damage to helicopter.

The Helicopter was substantially damaged. Following damages were observed during inspection.

a) The Cockpit found totally damaged and the Nose Landing Gear sheared off from the main attachment points. Radom area totally collapsed along with the weather radar and other electronic components.
b) Main structural members and Control Column (Control Rods) found broken. All Doors also found damaged.
c) MGB & Engine deck observed completely damaged including Engines, Main Rotors & Main Rotor Head.
d) Tail Boom found detached and broken into pieces. However, Tail Rotor & Tail Drive Shafts were found intact with centre shaft bent.
e) Helicopter toppled to left hand side & caught fire due to high engine temperature. Honey comb panels found burnt.
f) MGB all support broken due to impact and MGB goes down approx 6 inches.
g) Engine Mounting Broken due to heavy impact (LH & RH).
h) Engine to MGB LH & RH Coupling broken.

i) Out of four suspension bar, 03 were broken and one RH out/front (AWF) was bent.

j) Main Landing Gear were intact and in extended position with Door broken.

k) Tail Boom side Yaw Control found broken.

l) Tail Rotor got rubbed (chopping) with the fenestron.

1.4 Other damage:

Nil

1.5 Personnel information:

1.5.1 Pilot – in – Command:

AGE	: 51 years
Licence	: CHPL Holder
Date of Initial Issue	: 19.07.2007
Date of Re-Issue	: 19.07.2012
Valid up to	: 18.07.2017
Category	: Helicopter
Class	: Multi Engine Land
Endorsements as PIC	: Dauphin 365 N3, Alloutte III
Date of Med. Exam.	: 20.07.2015
Med. Exam valid upto	: 20.01.2016
FRTO Licence No.	: Valid on the day of accident
Total flying experience	: 5914:35 hours (Approx)
Total flying experience on type	: 1971:15 hrs
Experience as PIC on type	: 984:45 hours (Approx)
Last flown on type	: 23.11.2015

Total flying experience during last 180 days : 276:15 Hrs. (Approx)

Total flying experience during last 90 days	:	119:30 Hrs. (Approx)
Total flying experience during last 30 days	:	50:00 Hrs. (Approx)
Total flying experience during last 07 Days	:	24:35 Hrs. (Approx)
Total flying experience during last 24 Hours	:	05:00 Hrs. (Approx)

1.5.2 Co-Pilot:

AGE	: 50 years
Licence	: CHPL
Date of Initial Issue	: 08.12.2006
Date of Re-Issue	: 08.12.2011
Valid up to	: 07.12.2016
Category	: Helicopter
Class	: Multi Engine Land
Endorsements as PIC	: Dauphin 365 N3, BELL 407, Alloutte III
Date of Med. Exam.	: 04.11.2015
Med. Exam valid upto	: 03.05.2016
FRTO Licence No.	: Valid
Total flying experience	: 6616:30 hours
Total experiance on type	: 513:35 hours (Approx.)
Last flown on type	: 23.11.2015

Total flying experience during last 180 days	:	334:20 Hrs.
Total flying experience during last 90 days	:	168:25 Hrs.
Total flying experience during last 30 days	:	50:35 Hrs.
Total flying experience during last 07 Days	:	24:35 Hrs.
Total flying experience during last 24 Hours	:	05:00 Hrs.

1.6 Helicopter information:

Dauphin AS 365 N3 helicopter is a twin engine helicopter fitted with Arriel 2C engine and is manufactured by Eurocopter, France. The helicopter is certified in transport category for day and night operation under VFR & IFR. The maximum operating altitude of this helicopter is 15000 feet density altitude and maximum takeoff weight is 4300 kgs. Helicopter length is 13.684 meters and width is 3.285 meters, height of this helicopter is 3.808 meters. The helicopter is approved in the "Transport" category under FAR 29 amendment 16 category B & category A.

Construction:

The primary structure includes transmission deck, engine check strong frames, forward structure, body structure and aft structure. The new design structure stiffened plates replaced by NOMEX honeycomb panels with light alloy skin (lighter and more resistant material). The 3 main sections are as following: forward structure, body structure, and aft structure. Two strong frames to which are attached the main rotor shaft suspension bars.

The tail structure includes tail boom, horizontal stabilizer and side fins, Fin and tail rotor guard. The NOMEX honeycomb tail boom with light alloy skin, the tail boom, which may be disassembled, is bolted to the aft structure junction frame. It has high strength composite material fenestron fin. The stabilizer comprises of a one-piece carbon fabric, horizontal stabilizer which passes through the tail boom and two NOMEX sandwich structure side fins along with glass fiber tail rotor guard. The Secondary structure includes firewall, console, cabin floor, Luggage hold doors, Electric Equipment Racks and firewalls.

Dauphin AS 365 N helicopter VT-ELJ S/N 6239 has been manufactured on 30th Dec 1986. The helicopter is operated by Pawan Hans Ltd. Certificate of Registration No. 2318, under Category 'A' which was issued on 13.02.1987.

The certificate of Airworthiness Number 1868 was issued under normal category sub-division passenger issued by DGCA on 17.02.1987 and specifying minimum crew as one. The C of A was valid at the time of accident. ARC Ref No. DDAW-GT/1868/ARC/2015/07 and valid upto 01st July 2016. The maximum authorized all up weight is 4000 kgs. The aircraft was flown with Aeromobile Licence No. A-020/010-RLO (NR) and valid up to 31st December 2016. This helicopter was operated under Non-scheduled operator's permit No. 02/1998 and is valid upto 15th March 2017. Dauphin AS 365 N3 helicopter VT-ELJ has logged 22403:40 A/F Hrs as on 23rd Nov 2015.

Dauphin AS 365 N helicopter and Engines are being maintained under continuous maintenance as per maintenance program consisting of calendar period based maintenance and Flying Hours / Cycles based maintenance as per maintenance program approved by Office of DDG, DGCA, Mumbai.

Accordingly the last major inspection 1200 Hrs / 04 Year inspection was carried out at 22142:17 A/F Hrs on 21.05.2015. Subsequently all lower inspections, after last flight inspection and preflight checks were carried out as and when due before the accident.

The helicopter was last weighed on 01.08.2014 at Mumbai and the weight schedule was prepared and duly approved by DAW, DGCA, Mumbai. As per the approved weight schedule the Empty weight is 2499.69 kgs. Maximum Fuel capacity is 896 kgs. Maximum permissible load with 2 Pilots, Fuel and Oil tank full is 434.31 kgs. Empty weight CG is 4.164 meters aft of reference in land configuration. As there has not been any major modification affecting weight & balance since last weighing, hence the next weighing is due on 01.08.2019.

All the concerned Airworthiness Directive, Service Bulletins, DGCA Mandatory Modification on this helicopter and its engine have been complied with as & when due.

Turn Around Inspections are carried out by PHHL as per approved Turn Around Inspection schedules and all the higher inspection includes checks/inspection as per the manufacturer's guidelines as specified in "MSM" (Master Servicing Manual) and are approved by the CAM (WR).

The last fuel microbiological test was carried out on 03.10.2015 at DGCA approved facility and the colony count was within acceptable limits.

ENGINES

The Dauphin AS 365 N3 helicopter is fitted with two Turboshaft Arriel 1C engines manufactured by Turbomeca, France. VT-ELJ was fitted with LH Engine S/N 2373. This Engine had logged with 13409:14 Engine Hrs, 21410.10 Ng cycles and 13261 FT cycles respectively. The RH Engine installed is S/N 2371. This Engine had logged 15941:20 Hrs with 24062.05 Ng cycles and 16221 FT cycles respectively.

MAIN ROTOR BLADES

The AS 365 N3 helicopter VT-ELJ is fitted with 4 Main Rotor Blades having a SLL of 20000 Hrs. Details are as below:

The Main Rotor Blade

S/N	PART NO.	SERIAL NO.	COMPONENT HRS
1.	365A11-0050-07	6747	12746:43
2.	365A11-0050-07	6769	12116:42
3.	365A11-0050-08	9055	7662:40
4.	365A11-0050-09	11487	3319:27

The status of all Airworthiness Directives as issued by DGCA through mandatory modification for helicopter including Main Rotor blades also were checked and found satisfactory.

There is no special maintenances programme applicable to Main Rotor Blades as it is covered with the helicopter maintenance programme.

BRAKES

There are parking brake and pedal brakes installed for helicopter operation. Main Rotor Brake is installed for stopping of the Main Rotor Blades at a predetermined operation during shutting down of both engines.

1.7 Meteorological information:

Meluri helipad is an uncontrolled helipad and there is no meteorological information available. However the weather at the time of Departure from Dimapur was Visibility 2500 m, Winds Calm, Clouds not significant and QNH 1016 HPA at 0230 UTC. The enroute weather to Meluri was fair.

1.8 Aids to navigation:

The Dauphin AS 365 N3 helicopter is equipped with modern Equipments and has GPS for navigation in case of landing at temporary Helipad.

1.9 Communications:

Since Meluri is a temporary helipad in an uncontrolled air space, there was no two way communication available.

1.10 Aerodrome information:

The Helipad at Meluri is a temporary helipad and on Hill Top at approx 4200 ft AMSL having two sides i.e. East and West has clear approach and take-off funnel, however towards the South there is a hillock of approx 30 feet height. The surface of the helipad was made up of concrete, which was in bad condition except the 'H' marking. Loose concrete and powdered cement were found all over the helipad. There was no arrangement of Fire Fighting and Rescue Services during the period of operation. There was no Wind sock available at helipad for guiding the approaching helicopter.

1.10.1 Temporary Helipad

The requirement of temporary helipad are specified in CAR Section-4, Series B, Part II. The CAR specifies the following requirements in case of operations on temporary helipads.

1. The site to be used for temporary helicopter operations should be a level piece of well-drained ground, either good grass or solid surface free from

loose stones, debris. The Final Approach and Take off Area should be obstruction free.

2. Before undertaking any such flight, the helicopter operator and/ or his pilot must satisfy himself by his physical inspection on ground/ air and/ or obtaining required information from District authorities that surroundings are free from obstacles and the site suitable for operations of type of helicopter being operated and there is sufficient open space to force land, if necessary.
3. Helicopter operator through their Accountable Manager shall be responsible for the safety of helicopter operations, passengers and people on ground.
4. Permission of owner of the site shall be obtained, before it is used for helicopter operation and the district authorities notified in advance. It is the responsibility of the owner or the person having control of such place to ensure that the land is used as per the applicable local regulations.
5. When such place is used by helicopters carrying VIP all instructions issued from time to time in this regard shall be complied with by the operator through his Accountable Manager/ Pilot.
6. At least one 12 kgs powder (DCP) fire extinguisher shall be available at the landing/ take-off area, clearly marked and situated so that it can be used quickly in case of fire. A first aid box shall be placed within easy reach and clearly marked. The box shall be maintained in accordance with the instructions and its contents shall be supplemented whenever used.
7. While manoeuvring the helicopter in a low hover, helicopter should be manoeuvred in such a manner that its centreline is not closer to any objects/building than 1.5 x Rotor Diameter or 30 metres, whichever is the greater.
8. Approach and departure shall be performed within sectors which as far as possible shall be in direct continuation of the take-off and landing directions, respectively. The sectors shall be without obstacles in the entire width and in a vertical distance of at least 35 ft from the approach and departure surfaces.

9. Approach and departure shall be performed in a way that forced landing can be carried out on a suitable emergency landing area at any time, unless a helicopter with one engine out of operation is capable of clearing any obstacle in the sector with a clearance of at least 35 ft.
10. Before an area is used as take-off and landing area, operator shall take necessary measures to protect the site by cordoning, fencing with fragile material, etc. to ensure that no unauthorised persons, vehicles or stray animals enter into the perimeter of the safety area.

1.11 Flight recorders:

CVR:

CVR readout was carried out and following observations were made.

1. The Co-pilot cautioned the pilot about trees and wires in the right. The pilot replied that he was aware of it.
2. The Pilot asked from Co-pilot about left.
3. Pre Landing Checklist was carried out.
4. There was no discussion between the cockpit crew for not following the standard operating procedure for landing at Meluri helipad.

DFDR:

DFDR analysis was carried out and following observations were made:

HH:MM:SS	IAS	Engine 1_torque	Engine 2_torque	Heading	Collective pitch	Longitudinal cyclic pitch	Pitch attitude
215:09:42	19	33.2	15.44	186.2	60.24	54.46	9.23
215:09:42	0	33.6	15.44	186.2	60.24	54.46	9.23
215:09:43	0	34.5	15.93	188.04	60.88	54.31	9.23
215:09:44	0	35	16.22	185.41	61.32	53.87	9.23
215:09:44	18	35.4	16.22	185.41	61.32	53.87	9.23
215:09:45	18	36.6	16.71	186.29	60.34	52.36	9.14
215:09:46	17	35.7	16.41	186.37	59.95	51.45	9.67
215:09:47	15	33.5	15.34	185.85	57.9	50.09	10.2
215:09:48	20	32.9	15.05	184.44	59.66	51.67	10.37
215:09:48	0	33.7	15.05	184.44	59.66	51.67	10.37

1. At relative time (DFDR Clock) 215:09:42 the helicopter transited from flight attitude to hover as the speed became zero.
2. Thereafter after three seconds the Pilot aborted the landing and initiated go around from hover at time 215:09:44.
3. During the process of Go-around, after 05 seconds from hover at time 215:09:48, the helicopter speed immediately became zero.
4. The helicopter attained the maximum speed of 20 kts during this period.

1.12 Wreckage and impact information.

The Meluri helipad is on Hill Top at approx 4200 ft AMSL having two sides i.e. East and West are clear approaches and take-off funnel, however towards the south there is a hillock of approx. 30 feet height. The surface of the helipad was badly condition except on 'H' marking with loose mud and concrete/powdered cement were all over the helipad. As the helicopter, VT-ELJ made a normal approach to the helipad terminating into a hover at around 5-6 feet above the ground, due to the rotor downwash, a huge dust bowl engulfed the helicopter with the presence of loose mud and gravels around the helipad. The visibility of the Pilot was reduced totally due to the dust bowl.

Dense Dust Bowl during Approach

Helicopter Toppled to its left after impact

As the dust bowl was dense the pilot got disoriented and decided to abort the landing and initiated go around from hover with no visual contact with the ground obstructions. During the process of go-around, the main rotor blades hit the hillock. The impact was not severe, however all the four rotor blades sheared off from the root/attachment and were found nearby the main wreckage. Subsequently the nose of the helicopter hit the hillock and got substantially damaged. With the sudden arrest in the forward speed and shearing of main rotors the helicopter toppled on its left and impacted the ground. This further caused post impact fire in the aft cabin, engine compartment and front tail boom area.

Fire marks on front tail boom area

All the 4 rotor blades sheared off from root

There was no disintegration of any part of the helicopter during flight. The helicopter wreckage was confined to the area of final rest position of the helicopter.

1.13 Medical and pathological Information:

The preflight medical was carried out prior to the first flight of the day on 24/11/2015 at Dimapur and as per records the same was negative. Both the pilot sustained serious injuries after the accident and were rushed to the nearest

hospital for immediate medical attention. There was no ambulance vehicle available at the helipad prior to landing. Post accident the breath analyser test for alcohol was not carried out.

1.14 Fire:

There was post-accident fire. There was no provision for firefighting at the helipad. The fire was put off by the people around the helipad using the household utensils.

1.15 Survival aspects:

The accident was survivable.

1.16 Tests and research: NIL

1.17 Organizational and management information:

M/s Pawan Hans Limited (PHL) operates under Non Schedule Operator's Permit (NSOP) No. 02/1998 valid up to 15th March 2017. It has the biggest helicopters operations to the off shore for oil rig platforms. M/s PHL also holds the largest number of helicopters under NSOP.

The Company is headed by a Chairman & Managing Director (CMD) assisted by a team of professional of various departments. The Flight Safety Department is headed by Chief of Flight Safety approved by DGCA. The Chief of Safety is a General Manager in the company who reports directly to the CMD.

M/s Pawan Hans Limited has following fleet of helicopters:

- 17 Dauphin SA 365 N
- 15 Dauphin 365 N3
- 02 B3 helicopters
- 03 Bell 407
- 03 Bell 206 L4
- 03 MI-172 helicopters.

M/s PHL is also engage in contracts with number of state governments for providing helicopter services to the state Chief Minister and other VIPs. M/s PHL provides helicopter service at high altitudes for the pilgrims visiting Amarnath Ji caves in Srinagar, Jammu Kashmir, Kedarnath & Badrinath in Uttrakhand etc.

M/s PHL has a full established Operations training facility for the pilots. The simulator training is carried out at DGCA approved training facility. The Engineering training facility for the maintenance of the helicopter is established at Mumbai and Delhi.

1.18 Additional information:

1.18.1 Dimapur SOP:

M/s Pawan Hans developed an SOP for its operations in the state of Nagaland. Dimapur was designated as the base for conducting all the operations with effect from 01 Jun 2015 for conducting Scheduled/Non scheduled Flights of Nagaland State Govt. to important towns of each district which are approximately 30-40 minutes flight duration by SA 365 N Dauphin helicopter. The Dauphin helicopter will be utilized for conducting the necessary shuttles. In addition, flights may be undertaken for state VIP's such as Governor, Chief Minister etc. to other helipads in Nagaland.

ROUTINE OPERATIONS

NOTES

1. The above helipads are mostly used for passenger operations.
2. Regional QNH is not available and hence the thumb rule being used while flying over the hills in Nagaland is that QNH should be increased by 2 hpa for an increase in elevation of 1000 ft. eg. For a helipad elevation of 5000 ft, the regional QNH will be 10 hpa higher than Dimapur QNH. This regional QNH is to be set at the entry/exit from valley.

3. Dimapur ATZ is only till 10 NM. Beyond this, the route/valley control is with Jorhat ATC on 121.3 Mhz.
4. GRID MORA for NE sector from VEMR is 11,200 ft as indicated on the Jeppessen Charts. For SE sector it is 12,500 ft.
5. The hill ranges of Nagaland are generally aligned in North/South axis and valleys are not well defined. Flights to helipads entail crossing multiple ridges at an average height of 5000 ft. In case the ridges are covered with clouds, crossing over from East to West and vice versa would become difficult. Bad weather route may be planned and attempted with additional fuel as applicable/feasible.

FLIGHT PLANNING & CLEARANCES

1. After obtaining the Flying schedule/requisition for next day from NSTD (Nagaland State Transport Department), Base Assistant will make and file the Flight Plans to Guwahati Area with a copy to Dimapur ATC, one day prior, by FAX/Email, in consultation with Detachment Commander.
2. Base Assistant is to confirm telephonically that the next day's Flight Plans have been received and processed by Guwahati Area.
3. On the day of flying, Base Assistant is to obtain FIC, ADC and relevant weather info, at least one hour prior to take off.
4. Any subsequent changes/revision in Flight Plan are to be informed to Guwahati Area by Base Assistant.

APPLICABLE OPERATING MINIMA –DEPARTURE, ENROUTE, ARRIVAL

a) **Horizontal Visibility**. VFR –5 km and above, Special VFR >1km and <5 km.
b) **Cloud Ceiling** – As per VFR/ Special VFR conditions.
c) **Performance** –As per flight manual for the type of helicopter.
d) **Latest T/O time for SAR-** not later than 1 hour before sunset.

Positive weather clearance will be obtained from helipad in charge and the NST officials at Dimapur.

SECURITY POLICY: (Under Arrangements of Nagaland State Transport and the CISF at Dimapur Airport.)

a) **Security and frisking of passengers:** Adequate infrastructure for security and prior frisking of passengers boarding the helicopter at Dimapur Airport and all helipad is to be made available by Nagaland State Transport.

b) **Em-planing & De-planing :** NST personnel will be responsible for escorting, emplaning & deplaning of passengers, and are to approach the helicopters in full view of pilot after getting positive clearance from the Captain of helicopter.

c) Responsibilities of Helipad-in-Charge of NSTD

i. Marshalling of helicopter at the helipads is responsibility of helipad I/C. He will always be in view of the PIC. His clearance will be final for commencing flight, embarkation & disembarkation of passengers.
ii. Ensure only two passengers are escorted to the helicopter at a time.
iii. Ensure passengers are not wearing loose headgear or carrying umbrellas & walking sticks.
iv. Ensure hand baggage is kept in cargo compartment.
v. Signal by thumbs up sign that emplaning is completed.
vi. Inform destination of arrival/departure time.

HELIPAD MANAGEMENT

1. In order to ensure safety of helicopter and passengers, a helipad in charge of NST / Assam Rifles for safety and operations is to be appointed by the NST Authorities. The helipad In-charge will ensure the following:

a) **Safety:** The helipad In-Charge will ensure safety of helicopter and passengers. The helipad In-charge will at all times have communication facilities between Dimapur and his helipad location.

b) **Fire Fighting Facilities:** Adequate fire fighting facilities as laid down are to be made available at all times. Trained personnel are also to be available at the helipad to operate the equipment. At Dimapur Airport the fire fighting facilities of the Airport will be use in case of emergency.

c) **Refueling:** For scheduled operations, refueling is to be carried out by IOC at Dimapur Airport only.

d) **Helipad Inspection:** Helipad In charge will inspect the helipad and safety services everyday and declare the helipad fit for operation. He will also ensure that landing area and surroundings are clean and clear of loose articles / materials, which are likely to be picked up due to down wash of helicopter. He will further ensure periodic maintenance of helipad i.e. markings, repairs and windsock.

e) **Take Off, Landing And Emergency Procedure:** Take off, landing and emergency procedures are to be strictly followed as laid down in the Flight Manual. As per SOP, for Meluri helipad approach direction is 110/290.

f) Fire Fighting Equipment

i. Two trained personnel are to stand by next to the firefighting equipment during takeoff, landing and ground run of helicopter.

ii. CO2 cylinder is to be positioned next to engine mounting as per laid down procedure while starting the engine.

iii. Dry drill is also to be conducted every week under the guidance of OI/C helipad.

iv. The officer in charge Helipad will ensure that firefighting equipment provisioned will be of H2 category.

Duties of Helipad I/C :

1) He is to carry out daily inspection of helipad and equipment.

2) Helipad is to be swept periodically.
3) Any loose article / materials which is likely to be picked up due to rotor down wash is to be removed.
4) He must inform the pilot about general weather conditions on landline.
5) Any deterioration in weather is to be communicated immediately – through telephone.
6) He must ensure that helipad is clear before clearing the helicopter.

1.19 Useful or effective investigation techniques: NIL

2. ANALYSIS

2.1 Serviceability of the Helicopter:

Dauphin AS 365 N helicopter VT-ELJ S/N 6239 has been manufactured on 30th Dec 1986. The helicopter was registered with DGCA under the ownership of M/s Pawan Hans Ltd. At the time of accident the Certificate of Airworthiness and flight release prior to flight was current and valid. On the day of accident, the helicopter had logged 22403:40 Airframe Hours. This helicopter was operated under Non- Scheduled Operator's Permit 02/1998 and is valid upto 15th March 2017.

Dauphin AS 365 N helicopter and Engines are being maintained under continuous maintenance as per maintenance program consisting of calendar period and Flying Hours / Cycles based maintenance as per maintenance program approved by Office of DDG, DGCA, Mumbai. Accordingly the last major inspection 1200 Hrs / 04 Year inspection was carried out at 22142:17 A/F Hrs on 21.05.2015. Subsequently all lower inspections, after last flight inspection and pre-flight checks were carried out as and when due before the accident.

The LH Engine had logged 13409:14 Engine Hrs, 21410.10 Ng cycles and 13261 FT cycles respectively. The RH Engine installed is S/N 2371. This Engine

had logged 15941:20 Hrs with 24062.05 Ng cycles and 16221 FT cycles respectively.

All the concerned Airworthiness Directive, Service Bulletins, DGCA Mandatory Modification on this helicopter and its engine have been complied with as & when due. The defect record of the helicopter were scrutinized for a period of one month prior to the date of accident and no defect was found pending on the helicopter. Prior to the accident flight the weight and balance of the helicopter was well within the operating limits.

From the above it is inferred that the serviceability of the helicopter is not a factor to the accident.

2.2 Weather:

Meluri helipad is an uncontrolled helipad and there is no meteorological information available. However the weather at the time of Departure from Dimapur was Visibility 2500 m, Winds Calm, Clouds not significant and QNH 1016 HPA at 0230 UTC. No significant weather change was anticipated enroute to Meluri. The pilot also stated that the enroute weather from Dimapur to Meluri was fair with visibility of around 2500 metres.

It is therefore inferred that weather is not a contributory factor to the accident.

2.3 Temporary helipad at Meluri

DGCA CAR clearly defines the requirement regarding the operations on temporary helipads. As per CAR, the site to be used for temporary helicopter operations should be a level piece of well-drained ground free from loose stones, debris. The Final Approach and Take off Area should be obstruction free. Before the helipad is used for helicopter operation, the district authorities should be notified in advance.

At the helipad, at least one 12 kgs powder (DCP) fire extinguisher shall be available at the landing/ take-off area which can be utilised in case of fire. A first aid box should be available at the helipad. Further, the NST is required to ensure that before the helipad is used for operation, necessary measures to be taken to protect the site by cordoning, fencing, the firefighting, helipad management etc for the safe operations. Also to ensure that no unauthorised persons, vehicles or stray animals enter into the perimeter of the safety area. The Meluri helipad in charge under NST was required to abide by the above requirements laid in the CAR

On 18.11.2015, NST was informed about the scheduling of the operations at Meluri helipad. Even though NST was well aware about the operations, no inspection was carried out at the helipad.

From the above it is inferred that NST did not carry out any inspection to ensure that the helipad is free from dust and loose gravels prior to operations. This is a contributory factor to the accident.

2.4 Pilot handling of the helicopter:

On 24.11.2015, the helicopter VT-ELJ was planned to operate flight Dimapur-Mon-Meluri-Dimapur. The entire helicopter operations were under VFR Rules. The helicopter departed from Dimapur at 0252 UTC.

Helicopter took off from "Mon Helipad" at approx 0455 UTC for Melluri Helipad. Meluri is approximately 48 nautical miles at 107 radial from Dimapur, Nagaland. The PIC sighted the helipad with "H" mark, while approaching the Helipad. Both the pilots discussed to carry out a direct approach to the Meluri helipad from bearing 150-160 instead of making an approach over the town to land on the helipad on regular approach direction i.e. bearing 110/290 as per

SOP. The flight up to final was uneventful. However, when the helicopter was at around 25-30 ft away from the helipad, a small intensity dust from the hard ground (area well outside the helipad) was observed. The PIC decision to continue with approach and not initiating go around at this time further aggravated the situation as the dust intensity increased further.

The helicopter continued approach and thereafter terminating into hover. However, as he entered the area around helipad maintaining about 5-6 feet above the ground, due to the rotor downwash, a huge dust bowl engulfed the helicopter with the presence of loose mud and gravels around the helipad. The visibility of the Pilot was reduced totally due to the dust bowl. The helicopter forward speed at this moment was zero kts.

As the visibility due to the dust bowl became zero, the Pilot got disoriented and decided to abort the landing and initiate go around even though he had no visual contact with the ground/ obstructions and with the obstruction right in front of him.

The helicopter picked up speed and after 05 sec of Go-around procedure, the main rotor blade and subsequently nose of the helicopter hit the approx 30 feet high hillock. As the speed of the helicopter was low and around 20 kts, the helicopter toppled on its left causing post impact fire in the aft cabin, engine compartment and front tail boom area.

From the above it is inferred that the pilots non-judicious actions/in actions are contributory factor to the accident on the following account.

1. The crew did not follow the SOP of approaching the helipad from bearing 110/290 as it gives a clear way in case of aborted landing.
2. The crew did not appreciate the situation of going around, when encountered with small intensity dust prior to entering the helipad as

he had already deviated from SOP and any further miscalculation could lead to an incident/accident.

3. The crew attempted a go around with no visual contacts with the ground/ obstructions and obstruction right in front of him.

2.5 Circumstances Leading to the Accident:

Helicopter took off from "Mon Helipad" at approx 0455 UTC for Melluri Helipad. Meluri is approximately 48 nautical miles at 107 radial from Dimapur, Nagaland. The flight up to short final was uneventful. While approaching the Helipad the pilot observed vehicles and people in the road leading to helipad till inside the helipad area in the regular approach direction i.e. bearing 110/290 of the helipad. The PIC decided to deviate from SOP and to approach Meluri Helipad from bearing 150-160 as the approach funnel was free from obstructions. As the helicopter was around 25-30 ft away from the helipad, a small intensity dust from the hard ground (area well outside the helipad) was observed. The PIC decision to continue with approach and not initiating go around at this time further aggravated the situation as the dust intensity increased further. Also the PIC decision to initiate the go around with no visual contact with the ground/ obstructions eventually resulted in to the accident.

3. CONCLUSIONS:

3.1 Findings:

a) The Certificate of Airworthiness and the Certificate of Registration of the helicopter was valid on the date of accident.
b) The certificate of flight release was valid at the time of accident.
c) Both the Pilots were in the regular employment of PHL.
d) Both the pilots were duly qualified to carry out the operation in the region.
e) PHL Operations Manual, Chapter 34, pertaining to Mountain & High Altitude Flying, requires Ground and Flight training as essential

requirement before earmarking pilots for hill operations, the same was compiled by PHL operations Department.

f) On 18.11.2015, the Nagaland State Transport issued a letter to Pawan Hans scheduling the flight plan for the Sector Dimapur-Kohima-Mon-Meluri-Kohima also to the Yard Master, Meluri for information and to take necessary actions.

g) The PIC had accepted the helicopter for flight after the daily inspection schedule was carried out on the helicopter by the AME.

h) The helicopter was serviceable and there was no snag on the helicopter.

i) Prior to the accident flight the same operating crew had landed the helicopter at Mon helipad as per the flight plan and the sortie was uneventful.

j) During the second sector i.e. Mon-Meluri, the flight was uneventful till the flight terminated in to a hover and encountered dust over the helipad.

k) The regular approach direction of the helipad is bearing 110/290, however PIC decided to deviate from SOP and to approach Meluri Helipad from bearing 150-160.

l) When the helicopter was at around 25-30 ft away from the helipad, a small intensity dust from the hard ground (area well outside the helipad) was observed.

m) The crew did not appreciate the situation of going around, when encountered with small intensity dust prior to entering the helipad and decided to continue with approach.

n) As the helicopter entered the area around helipad maintaining about 5-6 feet above the ground, due to the rotor downwash, a huge dust bowl engulfed the helicopter with the presence of loose mud and gravels around the helipad.

o) The visibility of the Pilot was reduced totally due to the dust bowl.

p) Pilot got disoriented and decided to abort the landing and initiated go around from hover with no visual contact with the ground/ obstructions.

q) During the process of Go-around, the main rotor blade and subsequently nose of the helicopter hit the approx 30 feet high hillock ahead of his path in the south direction at about 90 feet distance from the "H" mark of the helipad.

r) As the speed of the helicopter was low, the helicopter toppled on its left causing post impact fire in the aft cabin, engine compartment and front tail boom area. The helicopter suffered substantial damage.

s) Both the cockpit crew and passengers were rescued by the local people and taken to Hospital at Kohima for the basic treatment.

t) Even though the Nagaland State Transport had prior information for operation of flight to Meluri helipad, the dusty heliapad was not watered and there was no arrangements made for firefighting and first aid.

u) The last Civil Helicopter Operation on Meluri helipad was by Pawan Hans on 28.06.2015

v) There was a post impact fire in the helicopter.

w) Weather was fine and not a contributory factor to the accident.

3.2 Probable cause of the Accident:

While landing, due to the rotor downwash, a huge dust bowl engulfed the helicopter thus reducing crew visibility. The crew got disoriented and initiated go around from hover with no visual contact with the ground/ obstructions and hit the hillock.

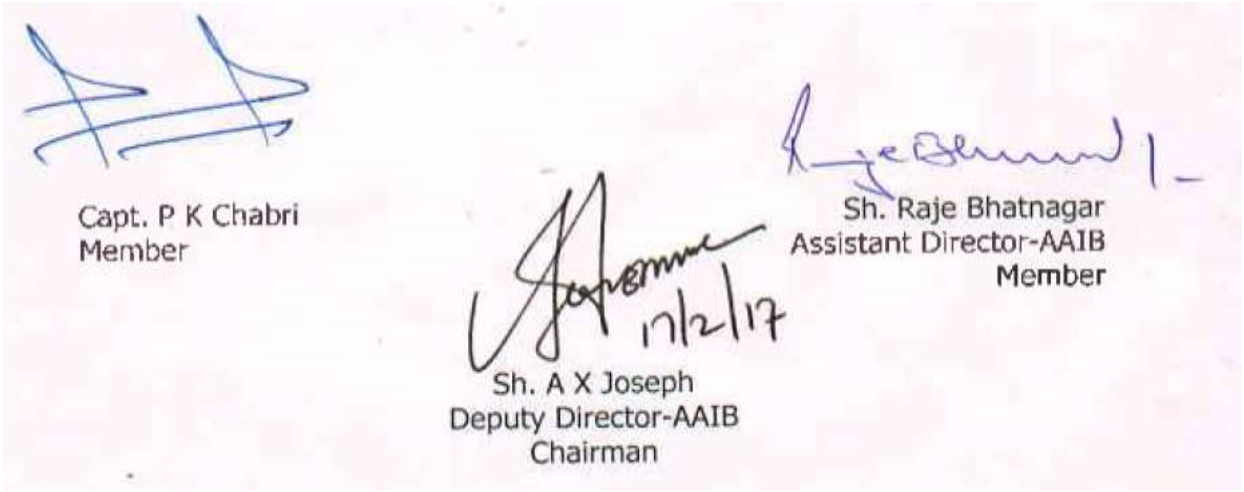
Contributory factor

a) Helipad condition and management.

b) The pilot did not follow the SOP procedure of approaching the helipad from bearing 110/290 as it gives a clear way in case of aborted landing is a factor to the accident.

4. SAFETY RECOMMENDATIONS:

1. DGCA may ensure Operations Department of Pawan Hans/Other Non - Scheduled Helicopter operators that while operating on temporary helipad the operating crew shall ensure that the requirement of DGCA CAR for operations on temporary helipad are fulfilled.
2. DGCA may advise Operations Department of Pawan Hans that operations on temporary helipads which are not frequently used, the SOP may include "the operating crew may carry out a recee of the helipad before landing for safe operations".
3. DGCA may advise M/s Pawan Hans to include the importance of adherence to SOPs and decisions making during training exercises/refresher and simulator training sessions.
4. DGCA may advice the Nagaland State Transport Department involved in Helicopter operations to ensure strict compliance of the requirements laid down in the CAR before clearing the helipad for operations and also take necessary preventive action to avoid its reoccurrence



Date: 17.02.2017
Place: New Delhi