



AIRCRAFT ACCIDENT REPORT

(OAS/2006/11/10/F)

Accident Investigation Bureau

**Report on the Accident Involving
OAS, Registration 5N – BHU, Along the road to
Delta Steel Company, Ovwian, Aladja,
(Near Osubi Airstrip), Warri, Delta State which
occurred on 10th November, 2006.**

This report was produced by the Accident Investigation Bureau (AIB), Murtala Muhammed Airport, Ikeja, Lagos.

The report is based upon the investigation carried out by Accident Investigation Bureau, in accordance with Annex 13 to the Convention on International Civil Aviation, Nigerian Civil Aviation Act 2006, and Civil Aviation (Investigation of Air Accidents and Incidents) Regulations.

In accordance with Annex 13 to the Convention on International Civil Aviation, it is not the purpose of aircraft accident/serious incident investigations to apportion blame or liability.

Readers are advised that Accident Investigation Bureau investigates for the sole purpose of enhancing aviation safety. Consequently, Accident Investigation Bureau reports are confined to matters of safety significance and should not be used for any other purpose.

As the Bureau believes that safety information is of great value if it is passed on for the use of others, readers are encouraged to copy or reprint for further distribution, acknowledging Accident Investigation Bureau as the source.

Recommendations in this report are addressed to the regulatory Authorities of the state (NCAA). It is for this authority to ensure enforcement.

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GLOSSARY OF ABBREVIATIONS USED IN THIS REPORT

DME:	- Distance Measurement Equipment
hPa:	- Hectopascal (Unit of Pressure Measurement)
ILS:	- Instrument Landing System
NDB:	- Non Directional Beacon
NOTAMS:	- Notices To Airmen
QNH:	- The Atmospheric Pressure at Mean Sea Level
Special VFR:	- Special Visual Flight Rules
State Weather Minima:	- Weather condition below which aircraft Operation is not authorized
UTC:	- Universal Time Coordinated (Nigerian Time UTC + 1)
VFR:	- Visual Flight Rules
VOR:	- Very High Frequency Omni Directional Radio Range

Aircraft Accident Report No: OAS/2006/11/10/F

Registered Owner and Operator: Odengene Air Shuttle (OAS) Limited

Aircraft Type and Model: AS 350 B2

Nationality: Nigerian

Registration: 5N-BHU

Location: Along road to Delta Steel Company, Ovwian, Aladja, near Osubi Airstrip, Warri, Delta State.

Date and Time: 10th November, 2006 at about 0905 hrs.
(All the times in this report are local time equivalent to UTC + 1) unless otherwise stated.

SYNOPSIS

The accident involving 5N-BHU belonging to OAS Helicopters was reported to the erstwhile Accident Investigation and Prevention Bureau (AIPB) on 10th November 2006. All relevant authorities were notified. The investigation into the accident began on the 11th November 2006.

The aircraft 5N-BHU (Helicopter) was conveying the MD/CEO and other staff of the company for a business meeting in Port Harcourt. It departed Lagos at 0713hrs under Special Visual Flight Rules (Special VFR) while maintaining 500 ft.

The aircraft could not continue the flight to Port Harcourt and was returning to Osubi airstrip due to bad weather. At 0904hrs, the Pilot could not give his position when requested by the Air Traffic Controller and collided with high tension cables belonging to Power Holding Company of Nigeria (PHCN) located along the road to Delta Steel Company, Ovwian, Aladja, Delta State. Three survivors were evacuated

from the wreckage while the fourth person was found fatally injured outside the aircraft. One of the three survivors later died in the hospital.

The investigation identified the following:

Causal Factor

The pilot's decision to conduct the flight under a Special Visual Flight Rule (SVFR) in an Instrument Meteorological Conditions (IMC) as depicted by the weather forecast.

Contributory Factors

1. The pilot's descent from 500ft without a clear visual reference.
2. The pilot was not instrument rated.

Four safety recommendations were made.

1.0 Factual Information

1.1 History of the flight

The helicopter which was owned and operated by OAS Helicopters departed Lagos at 0713hrs under Special VFR enroute Port Harcourt with four persons on board. The Helicopter was conveying the Managing Director/CEO and some staff of the Company for a business meeting at Port Harcourt. The aircraft was maintaining 500ft when the Pilot contacted Osubi airstrip at 0823hrs. The Controller passed the QNH 1012 hPa to the aircraft and to report when abeam Osubi airstrip.

At 0831hrs, the Pilot called the Controller and requested weather over the station and the following weather information was passed to the aircraft, which the Pilot acknowledged.

Wind	-	Calm
Visibility	-	4000m
Cloud	-	200ft Scattered
QNH	-	1012 hPa
Temp.	-	25° C

At 0834hrs, the aircraft reported abeam Osubi and the controller asked the Pilot to report when crossing River Niger at Patani. At 0854hrs the pilot called Osubi Tower that he was returning to the airstrip due to enroute bad weather. He gave a time of 6 minutes to the airstrip and an altitude of 200ft; but when the controller asked the Pilot to confirm his altitude, the pilot confirmed maintaining 500ft.

At 0904hrs, the controller called the pilot and requested his position. The Pilot acknowledged the call but could not give his position again.

Series of calls were then made by the controller and other aircraft belonging to Bristow Helicopters and Aero Contractors Nigeria

Limited flying in the area to re-establish contact with the aircraft but there was no response.

At 0909hrs, there was a telephone call from an eyewitness informing the Tower that a helicopter had crashed along the road to Delta Steel Company, Ovwian, Aladja, Delta State. The Osubi airstrip Fire Service moved to the site, which was about 10km South East of the field. The initial rescue operation was carried out by eyewitnesses and passers-by. Three persons were evacuated from the wreckage while the fourth person was fatally injured and found outside the aircraft. One of the three survivors later died in the hospital.

The accident occurred at about 0905hrs in day light.

1.2 Injuries to Persons:

Injuries	Crew	Passengers	Others
Fatal	Nil	2	Nil
Serious	1	1	Nil
Minor/None	Nil	Nil	Nil

1.3 Damage to Aircraft:

The aircraft was destroyed.

1.4 Other Damage:

The PHCN Tower structure was pulled down when the rotor blade struck the power transmission cable.

1.5 Personnel Information:

1.5.1 Pilot in Command

Nationality:	Filipino
Gender:	Male
Age:	54 yrs
Licence No.:	CPL 80 CH 231
Aircraft Ratings:	AS-350B/B2, AS-350B2, R-44, R-22, BJ-206B111, A-109, B-206B11.
Instrument Rating:	None
Proficiency Check:	17 th June 2006
Medical Certificate:	31 st December 2006
Total Flying Experience:	7100 hrs as at June 15, 2006
On Type	2281.7 hrs
Last 90 days	85.6 hrs
Last 28 days	Not Available
Last 24 hrs	5.1 hrs

The Pilot, in addition to carrying out the preflight inspection, signed the Certificate of Release to Service of the aircraft for the first flight of the day as the Company's only type - rated engineer was not available.

1.5.2 The Flight Dispatcher

Nationality: Nigerian
Gender: Male
Age: 44 yrs
Licence No.: None

1.6 Aircraft Information

Type: AS 350 B2
Year of Manufacture: 1998
Serial No.: 3146
Registration: 5N-BHU
Total Airframe Time: 1818 hrs 53 mins as at 09/11/2006
Cycles: 2686 cycles as at 31/03/2006
Certificate of Airworthiness Validity: 23rd December 2006
Certificate of Registration: 2nd August, 2005

1.6.1 Engines:

Type: Ariel 1D1
Manufacturer: Turbomeca, France
Serial No.: 9592

TSN/CSN: 1819 hrs 03 mins/3059 cycles as at
09/11/2006

Type of fuel used: JET A1.

1.7 Meteorological Information:

The weather forecast issued by Meteorological office in Lagos at 0400 UTC on the day of the accident was as follows:

Aerodrome	Date and time of issue	Period of Validity (UTC)	Type and time of change	Surface wind mean direction (°N) mean wind speed maximum wind speed	Prevailing visibility	weather	Cloud	
							Lowest layers Amount, height of base (metre) and type (if CB)	Higher layers Amount, height of base (metre) and type (if CB)
BENIN WARRI ENUGU	100400	06-15	TEMPO FM 0800 PROB 30 TEMPO	VRB/02KT 240/07KT MAX18 KT	6 KM 5000 M 10 KM 5000 M	BR NSW HZ	FEW 300 BKN 420 FEW 450	
CALABAR OWERRI P.HARCOURT	100400	06-15	FM 0800 TEMPO	CALM 210/06 KT MAX16 KT	300 M 10 KM	BR NSW	SCT 300 BKN 390 FEW 600 CB	

LAGOS	100400	06-15	PROB 30	000/00KT	3000 M	HZ	FEW	
IBADAN			FM 0900	210/08KT MAX18 KT	800 M	FG	270	
			PROB 30 TEMPO 12-15		6 KM	NSW	SCT 390	
					5000 M	HZ		

The current available weather information to the pilot at the time of the accident was as follows:

Time : 0700 UTC
 Wind : Calm
 Visibility : 4000 m
 Cloud : 200ft Scattered
 QNH : 1012 hPa

The weather information at Osubi airstrip was generated by an Automated Weather Information Display System (AWIDS). The system gives weather information continuously.

1.8 Aids to navigation:

The conditions of the navigation aids on the day of the accident were as follows:

NDB Ident “OS” Freq. 325KHz -Operational on test basis
 VOR/DME, Freq. 113.1MHz - Unserviceable
 ILS Ident “ISO” Localizer Freq. 111.1MHz - Unserviceable
 Approach Light of RWY 06 -Unserviceable

1.9 Communications:

The Communication between the Pilot, Murtala Muhammed Airport Control Tower and other enroute frequencies including Escravos and Osubi was good and effective.

1.10 Aerodrome Information:

1.10.1 The Crash Site

The accident occurred on a grassy surface along a major highway at about 6NM to Osubi airstrip which was the intended landing aerodrome.

Osubi Airstrip, also known as Warri Airport, is located at [Osubi](#), a town near Warri in [Delta State](#) on coordinates 05⁰35'52"N and 005⁰35'57"E. It has a paved runway with orientation 24/06 on elevation 27ft , dimension 1800 x 45 m and is about 5 minutes drive by car from the city of [Warri](#). The Fire Cover for the Airstrip is Category 6 and is a VFR field.

Osubi airstrip is owned and managed by Shell Petroleum Development Company Nigeria Limited (SPDC) while Air Traffic Services are provided by the Nigerian Airspace Management Agency (NAMA).

1.10.2 The Departure Heliport: Maryland Heliport

This heliport is owned and operated by Odengene Air Shuttle Services Ltd. (OAS Helicopters). It is located to the East of Murtala Muhammed Airport in the town of Maryland, Ikeja, Lagos State. The heliport is approximately 3 miles Northeast of Murtala Muhammed International Airport. The heliport is located approximately one hundred meters from the Maryland round about on the underground channel along Ikorodu road. The Heliport serves Air Shuttle, inter-state and city helicopters for MedEvac patient transfer, and connecting flights. There are three (3) helipads at Maryland Heliport and the declared distances are as follows:

- Take off Distance Available (TODAH) - 380.94FT
- Rejected Take-off Distance Available (RTODAH) - 217.44FT
- Landing Distance Available (LDAH) - 380.94 FT

Maryland Heliport Management has a signed memorandum of understanding with Nigerian Airspace Management Agency to provide Maryland Heliport with Air Traffic Services (ATS).

1.11 Flight Recorders:

The Helicopter was not equipped with a Flight Data Recorder or Cockpit Voice Recorder and neither was it required by law to be installed.

1.12 Wreckage and impact information:

The Helicopter's main rotor blades impacted the PHCN high tension cables and intertwined with them. As a result, the nearest PHCN tower structure (about 27m high) was pulled down and the helicopter crashed into a grassy field as shown in Figures 1 & 2 below.



Fig. 1: Photograph showing the damaged PHCN Tower Structure

The aircraft's wreckage was confined within a small area as shown in the photograph.



Fig. 2: Photograph showing the wreckage at its final resting position

1.13 Medical and Pathological Information:

The pilot was admitted in Lagoon Hospital, Apapa, Lagos after the crash. Medical examination revealed that he suffered injury mainly to the face, head, left forearm and both lower limbs. He had no history of loss of consciousness, though he was said to be unresponsive after the accident. There was no record of any toxicological examination performed on the pilot to determine the alcohol level or substance of abuse in his body. However, there was no evidence that physiological factors or incapacitation affected the performance of the pilot.

1.14 Fire:

There was no evidence of in-flight or post impact fire. According to the Air Traffic Controller on Duty, the response of the aerodrome Fire Service to the accident was prompt.

1.15 Survival Aspects:

The rescue operation was initially carried out by eyewitnesses and passers-by as the accident occurred along a major highway and fire service personnel moved on time to the crash site located at about 6NM to Osubi Airstrip. Three persons were evacuated from the wreckage while the fourth person was fatally injured and found outside the aircraft. There was a liveable volume for the occupants to survive after the crash.



Fig. 3: Photograph showing a relatively intact Cabin seats after the crash

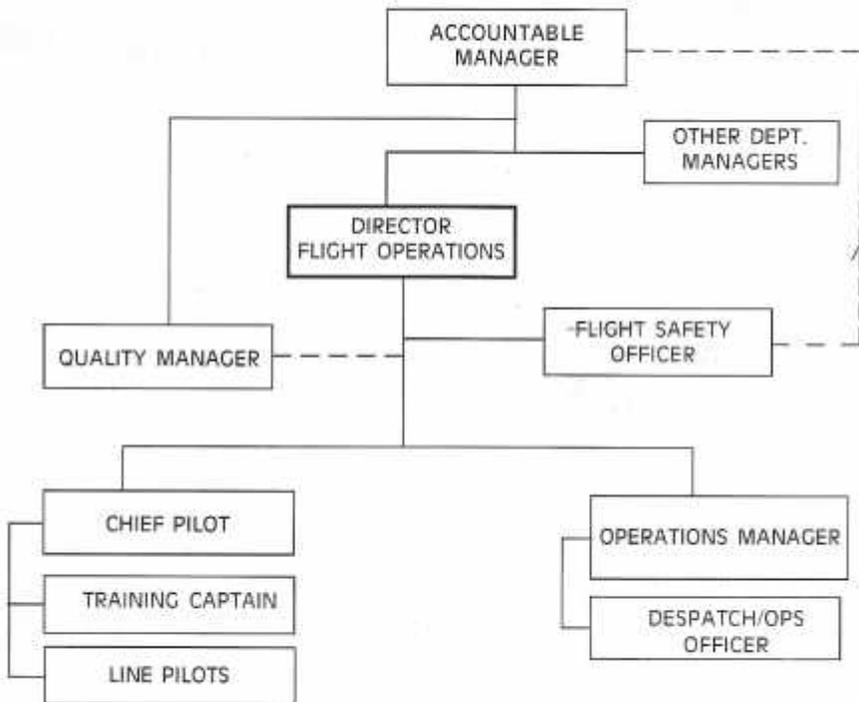
1.16 Test and Research:

Nil

1.17 Organizational and Management Information:



1.1.2 **ORGANISATION STRUCTURE - FLIGHT OPERATIONS**



1.17.1 The Operator

OAS Helicopters is an indigenous aviation company registered by the Corporate Affairs Commission (CAC) on 14th February 1992 and licensed by Nigeria Civil Aviation Authority (NCAA) to render Helicopter Flight Service within Nigeria and Africa, South of Sahara. OAS helicopters started commercial flight in January 2006. The company is located at Mobolaji Bank Anthony way Maryland, Ikeja, Lagos, Nigeria.

Odengene Air Shuttle Services Limited (OAS Helicopters) is a small growing company performing (charter, passenger, cargo and aerial work) commercial air transport operation under the Nigerian Civil Aviation Regulations.

It is therefore, a privately owned and operated facility to render commercial helicopter service using class 11 type helicopters.

1.17.1.2 Extracts from the Company’s Operation Manual

En-route Operating Minima for VFR Flights or VFR Portions of a Flight

General

(a) Descent below the minimum safe altitude to establish or resume visual contact flight should only be made in accordance with a notified instrument approach procedure at an airfield, a non - precision approach procedure at an offshore installation or the en-route descent procedure. An en-route descent offshore through cloud for the purpose of regaining visual contact with the surface should not be attempted unless the latest information available is that the conditions of cloud base and visibility likely to be encountered on completion of the descent are not less than;

Table 11 - En - route Operating Minima for Descent

	Day	Night
Cloud Base	600ft	1200ft
Visibility	4 km	5km

(b) VFR Flights are to be conducted in accordance with the Visual Flight Rules and in accordance with Table 2 para 8.1.3.1

VFR

(f) A commander shall not commence take-off unless current meteorological reports or a combination of current reports and forecasts indicate that the meteorological conditions along the route or that part of the route to be flown under VFR will, at the appropriate time, be such as to render compliance with these rules possible.

(g) When flight with a visibility of less than 5 km is permitted, the forward visibility should not be less than the distance travelled by the helicopter in 30 seconds so as to allow adequate opportunity to see and avoid obstacles. (See Table 4)

Table 2

Minimum Visibilities for VFR Operations

Airspace Class	ABCDE	F	G
		Above 900m (3000ft) AMSL or above 300 m (1000ft) Above terrain whichever is the higher.	At and below 900 m (3000ft) AMSL or 300 m (1000ft) above terrain whichever is the higher.
Distance from Cloud	1500 m horizontally 300 m (1000 ft) vertically		Clear of Cloud and in sight of surface
Airspace Class	ABCDE	F	G
Flight Visibility	8 km at and above 3050 m (10,000ft) AMSL (Note1) 5km below 3050 m (10,000ft) AMSL (Note 2)		5km (Note 2)

NOTE1: When the height of the transition altitude is lower than 3050 m (10, 000ft) AMSL, FL 100 should be used in lieu of 10, 000ft.

NOTE2: Helicopters may be operated in flight visibility down to 1500m by day, provided the appropriate ATS authority permits use of a flight visibility less than 5 km, and the circumstances are such that the probability of encounters with other traffic is low, and the IAS is 140 kts or less. When so prescribed by the appropriate ATS Authority, helicopters may be permitted to further operate down to a flight visibility of 800 m by day.

*Table 4
Minimum Visibility for VFR Operations*

<i>Visibility (m)</i>	<i>Advisory Speed (Knots)</i>
<i>800</i>	<i>50</i>
<i>1500</i>	<i>100</i>
<i>2000</i>	<i>120</i>

1.17.1.3 Flight Crew

Odengene Air Shuttle Limited Flight Crew members are the back bone of the organization. Flight Crew members are required to be active pilots and shall have minimum qualification of CPL (H) and IR ratings. Flight Crew members are encouraged to complete additional qualification courses as they advance in experience.

1.17.1.4 Dispatcher/Flight Operations

Dispatcher / Flight Operations of Odengene Air Shuttle Services Limited shall keep pilots aware of weather conditions at pilot's point of departure, enroute and

destination (airport, heliports etc). The Dispatcher shall also be the point of contact with keeping pilots up to date with all NOTAMS that the pilots need to be aware of while flying.

The Dispatcher shall have dispatcher's licence issued by NCAA.

1.17.1.5 IFR Operations

The Commander and co-pilot shall hold a valid instrument rating, except that, for a helicopter that is certificated for single pilot IFR operations the second pilot (if carried) need not comply with this requirement.

1.17.1.6 SINGLE-PILOT CREW

A single-pilot crew may be employed on IFR operations only in helicopters with a maximum approved seating configuration of nine passengers or less, provided that:

- (a) the pilot has been specifically trained in the single-crew role, with particular reference to cockpit management;*
- (b) all current proficiency checks have been conducted in the single-crew role on the subject helicopter type;*
- (c) the pilot must have the following minimum qualifications and experience prior to employment on an existing operation, or on an operation planned to take place in an environment similar to where item (v) experience has been accrued;*
 - (i) a valid ATPL (H);*
 - (ii) at least 700 hours flight time on helicopters;*
 - (iii) at least 300 hours flight time as pilot-in-command. This 300 hours as pilot-in-command may be substituted by co-pilot hours on a 2 for 1 basis provided those hours were gained*

within an established two pilot crew concept system described in this Operations Manual;

- (iv) at least 100 hours flight experience on helicopters flying by sole reference to instruments;*
- (v) 25 hours total IFR flight experience in the relevant operating environment;*
- (vi) 25 hours flight experience on the specific type of helicopter, approved for single pilot IFR, of which 10 hours is as commander or commander under supervision, including 5 sectors of IFR line flying under supervision using single pilot procedures; and*
- (vii) At least 5 IFR flights, including 3 instrument approaches, carried out in the preceding 90 days on the helicopter type in the single-pilot role. This requirement may be replaced by an IFR instrument approach check on the helicopter type;*
- (d) helicopter equipment includes a serviceable, certificated autopilot with at least altitude hold and heading mode; a headset and boom microphone with control-column transmit button, and a conveniently-placed illuminated chart holder.*

1.17.1.7 CLASS D Airspace

The fourth airspace is Class D Airspace which is generally that airspace from the surface to 2,500 feet above the airport elevation. Class D airspace only surrounds airports that have an operational control tower. Class D airspace is also tailored to meet the needs of the airport. Pilots are required to establish and maintain two-way radio communications with the ATC facility providing air traffic control services prior to entering the airspace. No separation services will be provided to pilots of VFR (Visual Flight Rules) aircraft. Pilots operating under VFR must still use "see-and-avoid" for aircraft separation.

1.17.2 The Nigerian Civil Aviation Authority (NCAA)

NCAA was established by decree 49 of 1999, with among others, the statutory responsibilities of ensuring regulating, monitoring and promotion of the safety, security, economic and reliability of air navigation oversight in line with International Civil Aviation Organization (ICAO) standard and recommended practices (SARPs). The Authority effectively commenced operations on 1st January, 2000.

1.17.2.1 Rating Required for IFR Operations

No person may act as pilot of a civil aircraft under IFR or in weather conditions less than the minimums prescribed for VFR flight unless -

- (1)The pilot holds an instrument rating or an ATP licence with an appropriate aircraft category, class and type (if required) rating for the aircraft being flown;*
- (2)In the case of helicopter, the pilot holds a helicopter instrument rating. (NCAR 8.4.1.6)*

1.17.2.2 Weather Limitations for VFR Flights

No person shall commence a flight to be conducted in accordance with VFR unless available current meteorological reports, or a combination of current reports and forecasts, indicate that the meteorological conditions along the route, or that part of the route to be flown under VFR, will, at the appropriate time, allow VFR operations. (NCAR 8.6.2.4)

1.17.2.3 Special VFR Operations

No person may conduct Special VFR flight operation to enter the traffic pattern, land or takeoff an aircraft under Special VFR from an aerodrome located in class B, class C, class D or class E airspace unless

- (1)Authorised by an ATC clearance*
- (2)The aircraft remain clear of clouds; and*

(3)The flight visibility is at least 1.5 km (1 statute mile)

1.17.3 Human Factor

Generally, it has become fashionable to believe that human error had assumed a very high percentage in all accident recorded worldwide. Accidents are typically a combination of several different causes; when such causes are viewed individually, it may often appear insignificant, but in combination with other causes it can complete a sequence of seemingly unrelated events that result in an accident.

The strongest evidence of a serious breach of a system's safety is an accident. Every accident is a chain of events that must be completed. The human factor consideration in this accident relates to Professor James Reason's "Swiss Cheese Model of Accident Causation".

1.18 Additional Information:

The record available to AIB showed that the Pilot-in-Command had only flown to Osubi once on 12th October, 2006. The second attempt was the diversionary flight that resulted in the accident.

1.19 Useful or effective investigation techniques

Nil

2.0 ANALYSIS

2.1 Conduct of the flight

The helicopter 5N-BHU was on a non scheduled flight from Lagos to Nigeria Air Force (NAF) base in Port Harcourt. At 0600 hrs, the pilot reported to the company's flight operations for weather report and to prepare for departure. This is in accordance with the Company's operations manual and the Nigeria Civil Aviation Regulations (Ops. Manual 8.13.1 f and NCAR 8.6.2.4). The pilot did the preflight and initial check of the helicopter and after being satisfied that the helicopter was fit to fly, he signed the technical log book / release for flight. Four persons including the pilot boarded the aircraft which was operated as a one-man crew. Before airborne from the company's base at Maryland, the pilot made a blind transmission to Lagos tower on 118.1MHz that 5N-BHU was ready to depart.

At 0713hrs the aircraft was airborne and the pilot established contact with Lagos Tower , thus; **"5N-BHU airborne Maryland at 0613z outbound to NAF base (Port Harcourt) with 4 souls, endurance 3:00 Hrs, maintaining 500' agl, estimating (zone out) at 0621z and NAF BASE destination at 0830z"**.

The pilot stated that all engines and related flight parameters were normal during initial cruise and that he established two way contact with the Escravos Tower at about 40 nautical miles to Escravos during which time he passed the flight details to the controller. The crew maintained 500ft VFR while estimating abeam Escravos at 0825hrs. When Escravos asked if 5N-BHU was north of the field, the answer was in the affirmative. The pilot checked abeam Escravos and gave his estimate for Escravos Corner as 0831hrs.

2.1.1 The Weather factor

The pilot reported a drastic reduction in visibility after passing Escravos Corner which necessitated his decision to divert to Osubi airstrip due weather. Osubi Tower controller reported 4000 meters visibility at this time.

However, the visibility was getting worse as the flight progressed towards Osubi and the pilot requested Osubi field weather details again which the controller gave, with visibility at 4000 meters in haze. AIB investigation revealed that the weather information at Osubi airstrip was generated by an automated weather information display system (AWIDS). The system gives weather information continuously but its visibility sensor was unserviceable and the visibility given at that time was based on targets. Eye witness interview also showed that the prevailing weather condition around the crash site was foggy and significantly different from that at Osubi airstrip at the time of the accident.

2.1.2 Minimum Visibility for VFR operations

According to the Company's Operations Manual as contained in table 2 above, for a Class D airspace such as Osubi, the visibility required to operate was 5 km but NOTE: 2 provided a waiver that Helicopters may be operated in flight visibility down to 1500m by day, provided the appropriate ATS authority permits use of a flight visibility less than 5 km, and the circumstances are such that the probability of encounters with other traffic is low, and the Indicated Air Speed (IAS) is 140 kts or less.

However, this waiver did not apply in that the probability of encounters with other traffic was high being a Niger Delta region where there are lots of helicopter operations with no state minima for the zone.

As the flight to Osubi could not be continued, the pilot decided to make a precautionary landing on an adequate field by the side of the highway.

2.1.3 Minimum Distance from Cloud

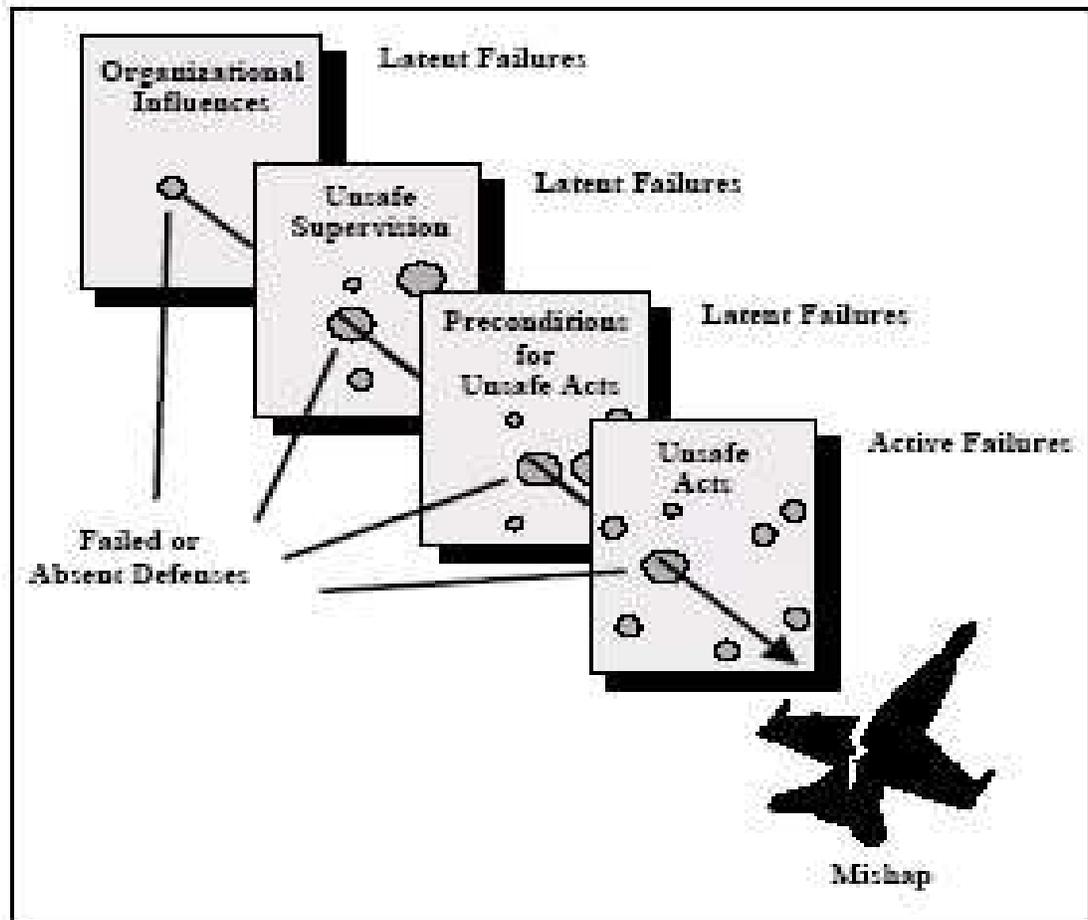
The minimum distance from cloud expected to be maintained by the pilot was 1, 500m horizontally and 300m (1, 000ft) vertically but the altitude maintained by the pilot was 500 ft and the cloud base was 200 ft. This implied that the separation between the aircraft and the cloud was barely 300ft (91m) depending on the cloud thickness. It is stated in section 8.13.1 (f) of the Operator's manual on *VFR* as follows "*A commander shall not commence take-off unless current meteorological reports or a combination of current reports and forecasts indicate that the meteorological conditions along the route or that part of the route to be flown under VFR will, at the appropriate time, be such as to render compliance with these rules possible*". (Table 2).

Considering the weather forecast available to the pilot, with cloud base at less than 600 ft along the route to be flown, the flight should not have departed. The dispatcher /flight operations should have guided the pilot accordingly but he had limited experience at this time and was not licensed as stipulated in the company's operations manual (*Ops Manual part A 2.2.8*).

2.2 Human Factors in this Accident

2.2.1 Swiss Cheese Model of Accident Causation

Professor James Reason hypothesizes that most accidents can be traced to one or more of four levels of failure: Organizational influences, unsafe supervision, preconditions for unsafe acts, and the unsafe acts themselves. In the Swiss Cheese model, an organization's defenses against failure are modeled as a series of barriers, represented as slices of Swiss cheese. The holes in the cheese slices represent individual weaknesses in individual parts of the system, and are continually varying in size and position in all slices. The system as a whole produces failures when all of the holes in each of the slices momentarily align, permitting (in Reason's words) "a trajectory of accident opportunity", so that a hazard passes through all of the holes in all of the defenses, leading to a failure.



Summary of Human Factor elements in this accident as illustrated in the Cheese model of accident causation above are as follows:

Organizational factor was evident in the company’s engagement of crew with insufficient qualification/training who possessed only the Commercial Helicopter Pilot Licence but no instrument rating as required in its Operations Manual.

The same applies to the Flight dispatcher who had no training, licence or approval but was practicing as a qualified dispatcher at the time of the accident contrary to the company’s operations manual (*Ops Manual part A 2.2.8 and Civil Aviation (Air Navigation) Regulations 2.4.4 of 2003*).

The enroute weather forecast available to the pilot did not favour Visual Flight Rule (VFR) but the pilot decided to conduct the flight regardless of the Company's Operations Manual.

The gap created by the exit of the company's engineer who was type rated on the helicopter that prompted the pilot to sign the Certificate of Release to Service for the first flight of the day was a precondition to unsafe act.

The Quality Assurance Manager expressed his concern about this to the Executive Director in an internal memo dated 10th November, 2006 incidentally, that was the day of the accident.

The decision of the pilot to take off from the operator's Maryland heliport by making a blind transmission to Lagos Tower without proper ATC authorization in such a busy airspace as well as his decision to descend below 500ft in an attempt to carry out a precautionary landing without a clear visual reference when diverting to Osubi airstrip enroute Porthacourt constituted unsafe acts.

2.2.2 Flight Dispatch/ATC Clearance

The helicopter took off from the Company's operational base in Maryland, Lagos without formal ATC clearance as required by the Nigerian Civil Aviation Regulation for the type of operation (Special VFR) the aircraft was engaged. According to the pilot, he only established contact with Lagos tower by making a blind transmission thus:

"5N-BHU airborne Maryland at 0613z outbound to NAF base (Port Harcourt) with 4 souls, endurance 3:00 Hrs, maintaining 500' agl, estimating (zone out) at 0621z and NAF BASE destination at 0830z".

This practice was unsafe in a controlled and busy airspace as Lagos where several flights are taking place simultaneously.

Proper authorization by ATC clearance should have been: request for engine start-up, taxi and ready for take-off.

2.2.3 The Crew training/Qualification

Sections 2.2.6 of the company's part A Ops. Manual states as follows: *Odengene Air Shuttle Limited Flight Crew members are the back bone of the organization. Flight Crew members are required to be active pilots and shall have minimum qualification of CPL (H) and IR ratings. Flight Crew members are encouraged to complete additional qualification courses as they advance in experience.*

However, the pilot only had CPL (H) but no instrument rating (IR). This was a disadvantage to a crew operating in weather conditions that was less than minimums prescribed for VFR flight. This was also in contravention of NCAR 8.4.1.6 which states that;

No person may act as pilot of a civil aircraft under IFR or in weather conditions less than the minimums prescribed for VFR flight unless -

*The pilot holds an instrument rating or an ATP licence with an appropriate aircraft category, class and type (if required) rating for the aircraft being flown;
In the case of helicopter, the pilot holds a helicopter instrument rating. (NCAR 8.4.1.6)*

Instrument Flying under the weather condition in which the pilot found himself would have been the best option as it would have precluded the chances of impacting terrain or obstacles.

3.0 CONCLUSIONS

3.1 Findings

- 3.1.1 The Pilot had a Commercial Pilot License (CPL) but no Instrument Rating (IR)
- 3.1.2 The Pilot had limitation on his license that “Holder shall possess correcting eyeglasses”.
- 3.1.3 The Pilot, in addition to carrying out the preflight inspection, signed the Certificate of Release to Service of the aircraft for the first flight of the day.
- 3.1.4 The Company’s only type rated engineer on AS 350 B2 helicopter was not in the country at the time of the accident.
- 3.1.5 The 5N-BHU departed Lagos for Port Harcourt under Special Visual Flight Rules maintaining 500ft above ground level (agl);
- 3.1.6 The NCAA approved navigational chart for the operator in its Ops Spec is Jeppesen but NAMA enroute navigational chart was used to conduct the flight.
- 3.1.7 The Helicopter was in contact with Osubi airstrip while enroute Port Harcourt but later diverted to Osubi due enroute bad weather.
- 3.1.8 The record available to AIB showed that the Pilot-in Command had only flown to Osubi once on 12th October, 2006. The second attempt as the diversionary flight that resulted in the accident.
- 3.1.9 The prevailing weather condition around the crash site was Hazy while the enroute weather to Osubi Airstrip was deteriorating according to the Captain.

- 3.1.10 There was no evidence of fuel spillage at the crash site, neither was there any fire out break. The helicopter was destroyed.
- 3.1.11 There were three survivors initially from the crash who were moved to Delta Steel Company's clinic and Shell Petroleum Development Company's clinic both in Warri. The survivors were later moved to Lagoon Hospital in Apapa, Lagos same day for better medical attention but one of them died some days later while the remains of the deceased was deposited at Etejia Hospital mortuary in Warri.
- 3.1.12 Osubi airstrip is owned and managed by Shell Petroleum Development Company; the navigational and landing aids were maintained by the company while air traffic services were provided by NAMA.
- 3.1.13 Osubi Airstrip is purely a VFR airfield with a D airspace classification.
- 3.1.14 The weather information at Osubi airstrip was generated by an Automated Weather Information Display System (AWIDS). The system gives weather information continuously but its visibility sensor was unserviceable and the visibility given at the time of accident was based on targets.
- 3.1.15 At the time of the accident, only the NDB was serviceable at the airstrip. The VOR/DME, ILS and runway 06 approach lights were unserviceable as contained in the NOTAM.

3.2 Causal factor

The pilot's decision to conduct the flight under a Special Visual Flight Rule (SVFR) in an Instrument Meteorological Conditions (IMC) as depicted by the weather forecast.

3.3 Contributory factors

1. The pilot's descent from 500ft without a clear visual reference.
2. The pilot was not instrument rated.

4.0 Safety Recommendations

- 4.1 NCAA should ensure that Power Holdings Company of Nigeria (PHCN) installs reflectors on its power transmission lines close to Take-off and Approach path of landing facilities in the Niger Delta region where lots of helicopter operations are going on (See Appendix A).
- 4.2 NCAA should ensure that the airstrip operator carries out repairs of the navigational/landing aids at Osubi Airstrip and the visibility sensor component of the Automated Weather Information Display System (AWIDS) as visibility is a critical component of weather information.
- 4.3 OAS Helicopter Quality Assurance should ensure that it complies with the approved operations manual on crew training/qualification by employing instrument rated pilots.
- 4.4 OAS Helicopter Quality Assurance should ensure compliance in keeping maintenance log book for the Main and Tail rotors of its helicopters as required by NCAR 8.3.1.9. (a) (1)
- 4.5 NCAA should mandate that all helicopters operating on single-pilot role must upgrade aircraft equipment to include the following; a serviceable certificated autopilot with at least altitude hold and heading mode, a headset and boom microphone with control-column transmit button, and a conveniently-placed illuminated chart holder to reduce operating work load.

APPENDIX A

REFLECTOR

