CIVIL AVIATION ACCIDENT
REPORT NO CIA 169

FEDERAL REPUBLIC OF NIGERIA

MINISTRY OF TRANSPORT AVIATION & COMMUNICATIONS
AIR TRANSPORT HEADQUARTERS
14 BROAD STREET, LAGOS.

ACCIDENT TO THE NIGERIA POLICE FORCE
BELL 412 HELICOPTER REGISTERED 9N-AQT
AT PORT-HARCOURT AIRPORT ON THE 20TH JANUARY 1992

FEDERAL MINISTRY OF TRANSPORT AND COMMUNICATIONS
AIR TRANSPORT HEADQUARTERS

ACCIDENT INVESTIGATION BUREAU
.....**DEPARTMENT**

P.M.B 12744
LAGOS NIGERIA.

Telegrams: Permaviate
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Ref. No.: CIA.169/03/92/100
12th March 19 93

The Honourable Secretary For Aviation,
Federal Ministry of Transport, Aviation
and Communications,
Headquarters,
Lagos.

Dear Sir,

Civil Aircraft Report No. CIA. 169

I have the honour to submit the report compiled by Mr. Remi Faminu, on the circumstances of the accident to the Nigeria Police Force's Bell 412 helicopter, registered 5N-AQT at Port-Harcourt International Airport on the 20th of January, 1992.

I have the honour to be Sir.

Yours faithfully,

K. K. O. SAGOE,
Deputy Director,
Accident Investigation Bureau.

AIRCRAFT DATA

Aircraft Type	-	Bell 412
Registration	-	5N - AQT
Serial No	-	33093
Construction Date	-	June 1983
Constructor	-	Bell Helicopter Textron Texas, U. S. A.
Owner	-	The Nigeria Police Force Lagos
Operator	-	The Nigeria Police Airwing General Aviation Terminal P. M. B. 21346 NMA - Ikeja
Airframe Time	-	1;345 hours
Powerplant	-	2 Pratt & Whitney PT6T-3B Engines
Place of Accident	-	Port Harcourt International Airport
Reference Point	-	N05.00.90/E006.57.00
Date of Accident	-	20th January 1992
Time of Accident	-	1549 hours UTC
Pilot-in-Command	-	S. O. Ofili
Licence	-	ATPL No 2881 (H)
Co-pilot	-	Yalwa Garba
License	-	CPL No 3786 (H)

FACTUAL INFORMATION

1.1 History of the Flight

The Inspector General of Police was on inspection tour of the police commands in Edo/Delta/Anambra States and it became the responsibility of the Police Airwing Rotarywing Section to convey him from point to point within these States.

At about 0700 hours on the morning of the day of the accident, 5N-AQT was flown from Benin City, the capital of Edo State, to convey the Inspector General and his entourage to Asaba. At take off time, the helicopter was observed by the crew to have about 1500lbs of aviation fuel on board the tanks, and souls on board were 10 men; Benin City to Asaba, flight time was about 40 minutes. On landing, the aircraft engines were shut down till about 1400 hours, within which time the helicopter's fuel tanks were refilled with the contents of 2 barrels out of the awaiting 5 barrels which had been strategically positioned for that purpose. The helicopter was airborne at about 1420 hours with the 2 flight crew members, one ground engineer and a passenger, and headed for Umuahia a flight duration time of 45 minutes.

At Umuahia, the aircraft was landed but the engines were kept on running on the ground for about 25 minutes.

Take off time from Umuahia was 1530 hours and the arrival time at Afikpo was 1600 hours; that was 30 minutes flight time duration. The aircraft did not land at Afikpo "for an unknown reason" as was given in evidence by the co-pilot. The technical logbook entry however, showed that the aircraft was sustained in the air overhead Afikpo for about 30 minutes. The crew nosed the aircraft towards Port Harcourt Via Umuahia cruising at the height of 2000 feet and the speed of 120 knots.

As soon as the course was set for Port Harcourt the co-pilot became worried about the fuel quantity situation and he pointed his fear to the captain's attention by asking him if the fuel would take them to the destination to which the captain replied to the affirmative.

The co-pilot rationalised the fuel quantity aboard with the distance ahead and was personally convinced within himself that the fuel would not get them to PHC. This conviction was later-on made known to the captain but the captain was still positive that the aircraft would make it to the destination. Questioning the captain later was as to why he did not land at Afikpo. He replied that he did not land because he was not comfortable with the fuel situation. He also confirmed the fuel quantity then to be about 500 pounds.

Afikpo to Port Harcourt was flown at 2000 feet and at the airspeed of 120 knots against the head wind speed of about 5 knots. Enroute overhead Umuahia, fuel quantity gage was observed to be approaching a critical level, which made the cockpit atmosphere to be very tense. Once again the co-pilot cautioned the captain about low fuel quantity and questioned: "Sir, will this fuel take us to Port Harcourt?"; but the captain assured him that the fuel would and then contained the flight.

About 20 nautical miles to Port Harcourt the low fuel level warning light came ON. The captain made several attempts to cancel the warning light as if it were a false alert. Realising the fact, the commander then remarked, "it looks as if I have to land anywhere now" but surprisingly he did not make an attempt to comply with his own judgement and he continued the flight towards Port Harcourt. After flying for sometime, the captain announced having the runway in sight and he was cleared by the Tower to continue to land. Still above the trees, the aircraft yawed a little bit to the right of the runway. As the helicopter started to descend from the 1000 ft height, the booster pump LOW PRESSURE warning light came ON. About a couple of seconds after the booster pump warning light, number one engine flamed out followed almost immediately by the number 2 engine's spooling down.

At this instance, the aircraft became unstable and started to drop rapidly. The cyclic control had to be raised to basically lift the aircraft's nose to prevent hitting the tree tops.

Skimming above the tree top brought the aircraft over the General Aviation Apron of the airport. To everyone's surprise (including that of the control tower), the captain did not execute an emergency landing. Instead, he overflew the Apron and the grass field and over to the main taxi way now heading towards the Main Apron. The instability now was so pronounced that the aircraft became tail low, impacted with the taxi way and broke off the tail boom. The accident occurred in the day light at about 1549 hours UTC.

It is pertinent to mention here that the accident occurred on the 20th January 1992 but all efforts by the N. A. A., the F. C. A. A. and the Accident Investigation Bureau, to get the Nigeria Police Force or its insurance agent to remove the wreckage from the active taxi way leading to the threshold of runway 21 proved abortive. The wreckage remained at the spot of accident till the end of March 1992.

A copy of a letter from the insurance company preventing "the insured or any other representative to remove item from the aircraft" is hereby presented in the appendix.

1.2 Injuries to Persons

Injuries	Crew	Passengers	Other
Fatal	0	0	0
Serious	0	0	0
Minor/None	2/0	0/2	

1.3 Damage to Aircraft

The skid tubes were broken off when the aircraft impacted with the ground and the tail boom fractured from the fuselage while the tail rotor and its gear box broke away the end section of the tail boom. The main rotors were totally destroyed. The engines and the engine cowls were badly damaged. There were evidence of various types of damages on the fuselage before coming to rest on its staboard side. The main transmission gearbox must have also been seriously damaged.

1.4 Other Damage

No other damage than some scratches on the taxi way asphalt surface.

1.5 Personnel Information

1.5.1 The pilot-in-command was born on the 17th September 1950 and holds an Airline Transport Pilot Licence number 2881 on rotarywing. Capt Ofili's flying experience included part one ratings on Bell 47, Bell 206 and Bell 412 on all of which he has accumulated total flying time of about 3000 hours and has about 1000 hours on Bell 412 type experience.

The captain's medical certificate would expire on 21st October 1991 and licence on the 20th April 1992. He was qualified to take the flight.

1.5.2 The co-pilot was born on the 15th January 1956 and he holds a commercial Pilot Licence number 3786 on rotarywings. Deputy Superintendent of Police Garuba Yalwa was issued with his license on the 27th December 1985 and was a part 1 rating on Bell 206B which was endorsed into his licence on the 26th April 1991. His total flying experience amounted to 145 hours and his type experience was 76 hours.

The co-pilot's medical certificate would expire on the 24th April 1992. The licence would, therefore, be valid until 24th April 1992. There was no restriction of any type placed on the licence and he was found qualified to take the flight.

1.6 Aircraft Information

1.6.1 The helicopter was acquired when new by the Nigeria Police Force and it came under Nigerian Aircraft registration on the 26th August 1983 when its first certificate of Airworthiness was issued on the 5th September 1983. The last certificate of Airworthiness was renewed on the 25th April 1991, and would expire on the 24th April 1992 but the aircraft crashed on the 20th January 1992.

The aircraft had the history of non-conformity with good maintenance record. The Technical log books, from inception of Operation, were not properly filled out. The Deferred Defects List had only 2 improperly filled and undated entries. How and when entries were cleared were never entered into logbooks. The component cards were kept only for about 465 hours since new and were thereafter, abandoned entirely. Very important daily flying records were not filled out at all into the Technical logbook of the aircraft. Essential records of "fuel uplift" in both inboard and outboard front and rear fuel tanks have never been filled out in their respective spaces within many used technical logbooklets.

Engine oil sections of the tech log were never filled out in the book. The flight crew was never in the discipline of knowing how much fuel or oil its aircraft was carrying or how much fuel was left on board because these important records were not judiciously adhered to.

This aircraft, and probably all the aircraft in the fleet of the rotarywing squadron of the Nigeria Police Force have no impressive record keeping philosophy. According to the logbooks, 5N-AQT helicopter never had a snag or operational deficiency throughout its lifetime before the accident.

1.6.2 It is never possible to guess or accurately calculate the true weight and the centre of gravity of this aircraft if they were within the prescribed limits during the phase of operation related to this accident, because the proper loading information were not kept in the appropriate record book. However, it could be reasonably argued that the centre of gravity of this aircraft was progressively going aft limit until it became unstable and uncontrollabe.

1.6.3 The type of fuel being uplifted and being used at the time of this accident was Aviation fuel Jet A-1, which was uplifted from all sorts of barrels and drums. The way and manner of getting fuel into the tanks are not always in compliance with good practice of aviation fuelling. It is not possible to say categorically, at any point in time, how much fuel the aircraft had on board because the only means of ascertaining this fact is by reading the fuel gage. And what was the calibration accuracy of the gages before the crash? This would be impossible to ascertain.

1.7 Meteorological Information

Trend landing forecast for Port Harcourt at the time 1500 hours on the day of the accident was generally good weather with 6 kilometer of visibility in slight dust haze Temperature was 21^0 celsius.

1.8 Aids to Navigation

Navigational Aids were not contributory factor in the accident. The flight was by visual flight regulations.

1.9 Communication

There was good radio communication between the aircraft and Port Harcourt tower.

1.10 Aerodrome Information

The perimeter boundary of Port Harcourt International airport is made up of mangrove type of vegetation consisting mainly of tall palm trees (please see appendix 3A). Immediately after clearing over these palm trees is vast area of clear field, where any rotarywing can be safely landed. The closest point to land after the boundary trees is the General Aviation Apron which are the vast field immediately succeeded by large taxi area which connects the main apron with the threshold of runway 21.

1.11 Flight Recorders

Neither CVR nor FDR was installed.

1.12 Wreckage and Impact Information

The aircraft started to break up after impacting severely with the ground surface. The tail rotor hit the tarmac first before the skids hit the surface and broke-off. The fuselage then impacted with the surface, then still in some considerable amount of foreward motion, the aircraft skidded along the taxi-way before overturning on its starboard side and careered on its side for about 26.5 meters before coming to rest in that position.

1.13 Medical and Pathological Information

The flight crew members were met after the accident and none of them was seriously injured.

1.14 Fire

There was no fire outbreak.

1.15 Survival Aspects

The accident was survivable owing to the simple fact there was no fire out break.

1.16 Tests and Research

There was neither any special tests nor any research necessary to come to a conclusion for the cause of the accident.

1.17 Additional Information

None.

1.18 Useful or effective Investigation Techniques.

None was involved.

2 ANALYSIS

2.1 Aircraft Operational Accountability

From the point of view of the Civil Aviation Regulation 51 section 2, "An aircraft registered in Nigeria shall, when in flight, carry documents in accordance with the Eleventh Schedule to these Regulation:".
Document "F" under the Eleventh Schedule specified that the technical log if any, in which entries are made is required to be carried on board.
A part of the required entries in the "technical logbook"

is the "Fuel Uplift" and the TOTAL fuel on board. Another item is the "engine oil" uplift and TOTAL oil on board, both of which have never been complied with in the flying history of the Nigeria Police Force Airwing, (Rotarywing Division).

It is, therefore, incumbent upon the commander of an aircraft as prescribed by the Civil Aviation (Air Navigation). Regulation 26(e) that, "in the case of flying machine or airship, that sufficient fuel, oil and engine coolant (if required) are carried for the intended flight, and a safe margin has been allowed for contingencies, and, in the case of flight for the purpose of public transport, that the instructions in the operations manual relating to fuel, oil and engine coolant have been complied with;"

The lack of compliance with the Civil Aviation Regulation has become a factor in this accident. This non-compliance with technical logbook entries has also deprived the Accident Investigation Bureau the opportunity to look critically into the loading configuration of the aircraft as far as calculation of the total weight of the aircraft and the determination of its centre of gravity are concerned. The flight crew has, therefore, contravened the Civil Aviation Regulations in many ways than one.

2.2. FUEL MANAGEMENT

Since it is the norm for the Police Rotarywing section not to keep adequate record of the amount of fuel "uplift"; such data to indicate facts like the total fuel on board to determine fuel burnt for each trip sector, and which may be necessary for the centre of gravity calculation are terribly missing. Both the ground crew and the flight crew have reduced the art of modern aviation operation to that of mere guess work.

The commander of this helicopter and his co-pilot gave evidence after the accident that the amount of fuel onboard before flight that morning was "about fifteen hundred pounds (1500 lbs)" indicated by the aircraft instrument. The AIB considers this idea of absolute fuel-quantity-gage-dependency to be utterly unacceptable.

It is a bad practice in the sense that instrument error can occur at any mode, whether static on the ground or in flight operation. There should be a back-up means to determine a more reliable determination of the total fuel quantity on board.

The flight crew gave verbal evidence that the fuel quantity gage was indicating 1,500 pounds before the Benin - Asaba flight on the morning of the accident. The Bureau considers this to be a

vague idea of the fuel on board, allowing for the fuel gage calibration error which has not been performed since the aircraft has been in operation. The "Bell 412 flight Manual" indicates that the total fuel capacity for the aircraft model is 214 US gallons or 810 litres; out of 211.4 US gallons are usable.

For the aircraft's performance calculations, the technical data are abstracted from the FLIGHT MANUAL and the raw data are as given by the flight crew:

Aircraft Empty Weight (FM)	-	7217.6 Ibs
Engine Operation	-	2
Wind Speed	-	Zero
Pressure Altitude	-	2000 ft
Outside Air Temp.	-	31°C

First Sector Trip

Benin - Asaba

Airspeed	-	120 knots
Duration of Flight	-	40 minutes
Passenger + Crew	-	1700 Ibs
Fuel Quantity	-	1455 Ib (full tank)
All - Up - Weight	-	10,373 Ibs

Fuel Calculation

Fuel on board				1455 Ibs
Fuel consumed	= $\frac{40}{60}$	x 760	= -	507 Ibs
				948Ibs

Second Sector Trip

Asaba - Umuahia

Duration	-	45 minutes	
A-U-W	-	9565 Ibs	
Fuel on Board		=	948 Ibs
Fuel Uplifted (2 drums)		=	+717 Ibs
Fuel Consumed = $\frac{25}{60}$ x 740 Ib/hr		=	-555 Ibs
Aircraft idle on ground 25 min i.e 25 x 100 Ib/hr		=	-25 Ibs
Fuel remaining on board			1085 Ibs

Third Sector Trip

Umuahia - Afikpo

Duration	-	30 minutes	
A-U-W	-	8987 Ibs	
Fuel on Board		=	1085 Ibs
Fuel Consumed = $\frac{30}{60}$ x 740 Ib/hr		=	-370 Ibs
Circling Overhead Afikpo - 30 min i.e $\frac{30}{60}$ x 540 Ib/hr		=	-270 Ibs
Fuel remaining on board			445 Ibs

Fourth Sector Trip

Afikpo - Port Harcourt

Duration	-	35 minutes (see Appendix)	
A-U-W	-	8345 Ibs	
Fuel on Board		=	445 Ibs
Fuel Consumed = $\frac{35}{60}$ x 725 Ib/hr		=	-423 Ibs
Fuel remaining on board		=	20 Ibs
Minus Residual Fuel		=	-20.4 Ibs
Fuel usable			0.0 Ibs

while still in flight

2.4 THE CREW

If the calculations in the chapter 2.2 of this report are based on the fallacious raw data as submitted to the AIB by the duplicitous crew, the aircraft engines would still have failed somewhere on the final approach Path. But an important point implicating the guileful crew is that, with reference to the itinerary chart in the appendix 2, the Afikpo to Port Harcourt flight, through Umuahia, would have taken double the time duration as Umuahia to Afikpo flight. The entries in the aircraft technical logbook are, therefore falsified by the crew for entering 30 minutes flight time for Umuahia to Afikpo and entering 35 minutes for Afikpo to Port Harcourt while flying-by Umuahia at the same air speed. A look at the chart of Nigeria (Appendix 2) which is to scale, will show anyone that it is not possible to attain that flying feat while maintaining the same airspeed according to the crew's evidence. Investigations, however, reveal that Afikpo to Port Harcourt actually took about 50 minutes.

The crew has, therefore, falsified the logbook entry by entering 35 minutes and has, therefore, committed an offence again at the Civil Aviation (Air Navigation) Regulation 55 section (2): "..... or knowingly make, or produce or assist in the making, of, any false entry in or material omission from any such logbook or record or destroy any logbook or record during the period for which it is required under these Regulations to be preserved". And this is a serious offence in Civil Aviation World-wide, which must be stemmed and be discouraged in Nigeria.

Despite the acuteness of the emergency situation, the pilot continued to be foolhardy by neglecting to land immediately on the General Aviation Apron or there-about. Instead, the commander tried to fly the powerless helicopter to the main Apron before crashing the aircraft on the taxi-way to the runway 21 threshold. He had, therefore, executed a bad judgement not befitting the standard of his profession because that accident was actually avoidable if he had executed an immediate touchdown after entering the airport perimeter boundary.

3 CONCLUSIONS

3.1 Findings

3.1.1 The Accident Investigation Bureau is able to establish that the helicopter was properly registered in accordance with the Civil Aviation Regulations of Federal Republic of Nigeria.

3.1.2 The flight crew was also found to be certified to hold licences and operate the type of aircraft that was involved in the accident.

3.1.3 There was no known physiological factor, or medical history concerning the two pilots, which would have prohibited them from operating the flight on that day.

3.1.4 Findings established that the maintenance crew were not properly filling in the necessary technical information in the aircraft technical logbook before releasing the machine for daily flights.

3.1.5 Findings also established that the flight crew has never been complying with the Civil Aviation Regulations by properly filling out the aircraft's technical logbook at the end of every flight as would, normally, be required of professionals.

3.1.6 By not keeping proper information in the technical logbook both by the ground and the air crews has subjected aviation operation to that of guess work and vague ideas.

3.1.7 Investigations show that the flight to Afikpo was unplanned for in terms of contingencies and was found not necessary because it was not included in the IGP's tour of inspection of the Police Commands in the states under visit. It was, therefore, a reckless misadventure.

3.1.8 After making the unnecessary flight the crew tried to cover-up by declaring false flight time duration into the aircraft technical logbook thereby contravening the Civil Aviation Regulations of the land.

3.1.9 There was a pilot/co-pilot spilt decision in the cockpit about the aircraft's endurance and the commander had failed to take necessary action to declare an emergency situation when he became convinced that the fuel would not get them to the destination. His actions have thereby endangered the lives on board and endangered the property of his employer.

3.1.10 Even after the engine flamed out, the aircraft could still be saved from destruction, if the commander had initiated an emergency landing immediately after clearing the hazardous obstacles.

3.1.11 Attempt to land the aircraft on the main apron in pretence to down-play the emergency situation led to this accident and the catastrophic end of the helicopter.

3.2 Cause of the Accident

3.2.1 The probable cause of the accident is the fuel starvation of the aircraft's engines, a consequence of not keeping with the Civil Aviation Regulations of Nigeria on keeping tech log records.

3.2.2 The contributory factor is the unresourceful decision of the commander to down play the emergency situation by not setting the helicopter down at the earliest opportunity whereas those opportunities abound everywhere at the airport's periphery.

5 APPENDICES

5.1 Copy of the Insurance letter implicating itself with the course of accident Investigation.

5.2 Chart of Nigeria showing the helicopter's itinerary on the day of the accident.

5.3 Jeppesen's Port Harcourt Airport approach plate.

5.4 The wreckage's photograph on the taxiway.

5.5 Bell 412 manufacturer's fuel flow versus Airspeed data.

APPENDIX 1

NATIONAL INSURANCE CORPORATION OF NIGERIA

APPENDIX 1

Telegrams & Cables) NICON LAGOS

5, Customs Street.
P. O. Box 1100, Lagos

Tel 666812 666813
666012 666013
666034 666035
666323 666312
Telex 22651 22659

Your Ref

Our Ref AVN/92/00A/1e

13 March 1992

The Managing Director
Samshow Consultants
17A Mobolaji Bank Anthony Way
Ikeja
Lagos

Dear Sir

REMOVAL OF WRECKAGE OF CRASHED POLICE HELICOPTER, 5N-AQT FROM PORT HARCOURT AIRPORT

We refer to the meeting which the undersigned and his Executive Director(Special Risks) Mr J.I. Abulime, held with you on the 11th March 1992 to discuss among other things, your professional charges for the removal of the wreckage of Nigeria Police 412 Helicopter at Port Harcourt International Airport.

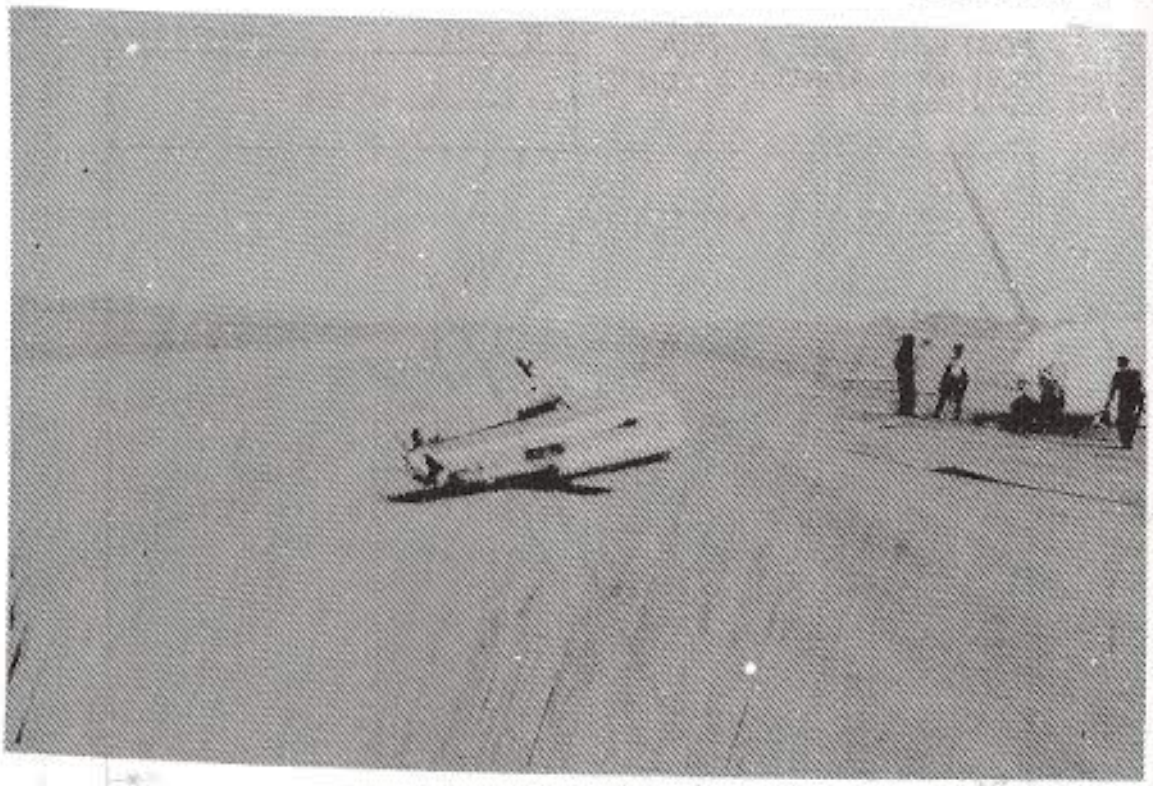
We are pleased to convey Management's approval for you to proceed and recover the salvage at the negotiated amount of N250,000.00 to your warehouse in Lagos. As mentioned to you, you must ensure that there are no further damage to potentially salvageable components of the aircraft. We hope the recovery will be done in the best professional manner.

As you are already aware, the salvage belongs to NICON and on no account must you allow the insured or any other representative to remove any item from the aircraft. Please keep us informed immediately the aircraft is brought to Lagos to enable us ask for bidders for the salvage.

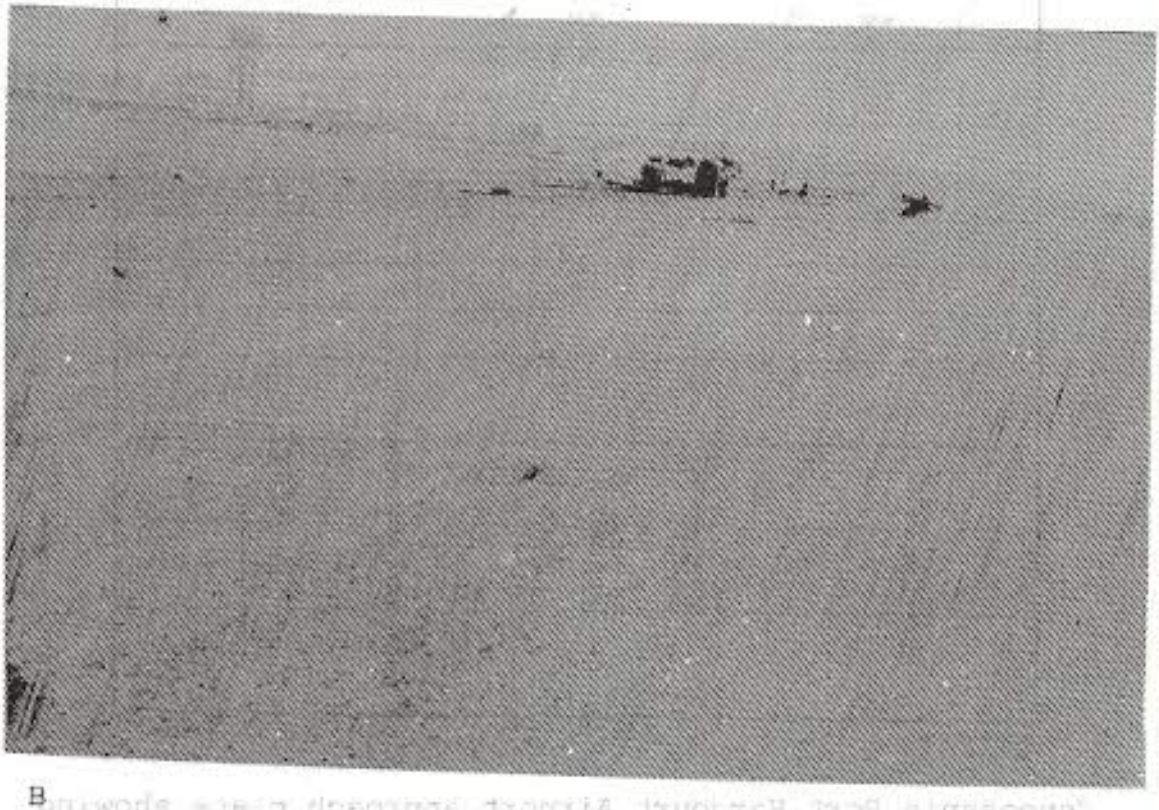
We hope you will carry out this assignment with utmost discharge in view of the danger it is posing at the taxi-way where the accident occurred.

Yours faithfully

O. O. Atoloye
Aviation Manager
for MANAGING DIRECTOR



The picture of the taxiway where the accident occurred showing the severed tail boom.



B

The helicopter wreckage lying on its staboard side after a failed attempt to reach the main apron.

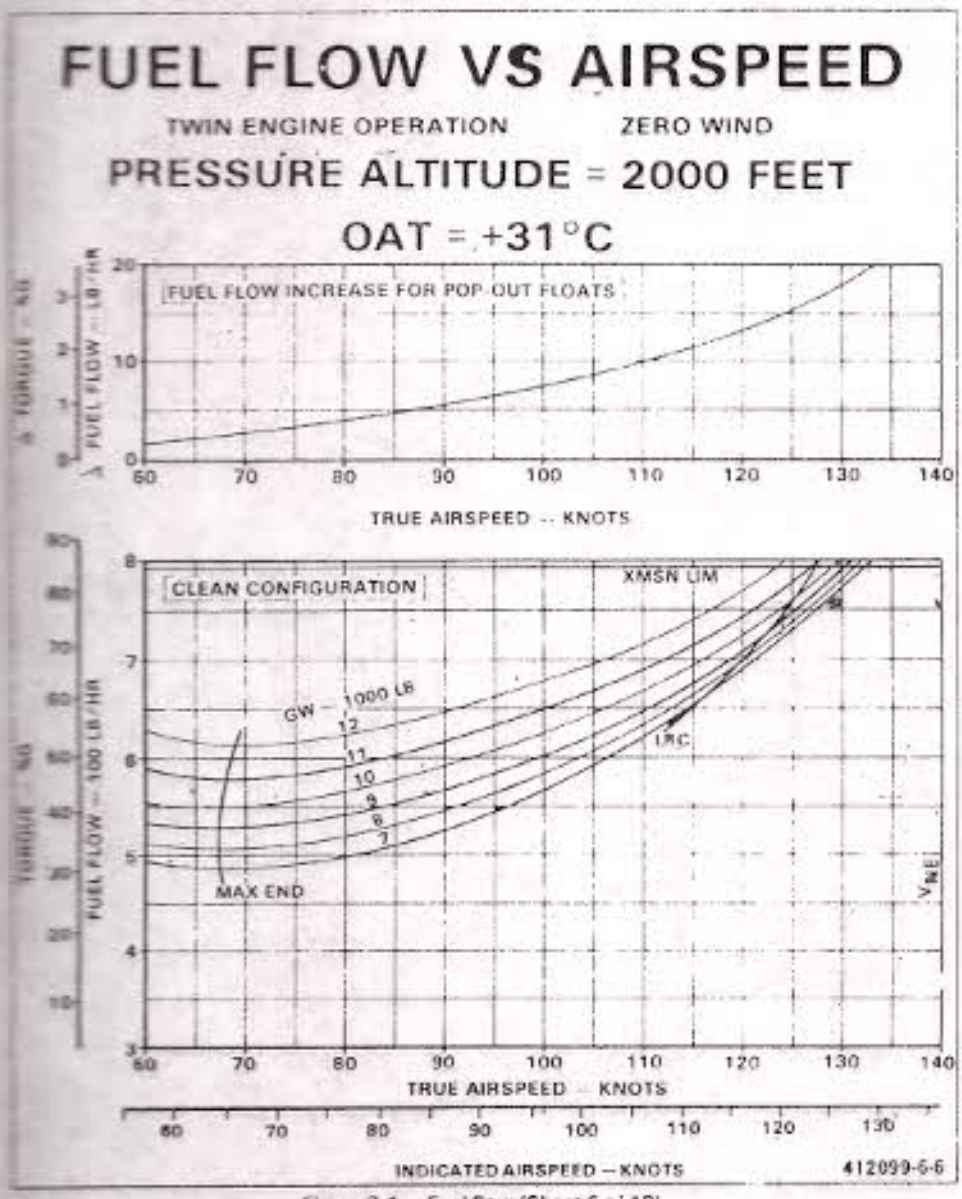


Figure 3-1. Fuel flow (Sheet 6 of 18)

Fuel flow vs Airspeed Chart used for calculating the trip segment fuel consumption rate.