

AAIPU# A-13-00906



AIR ACCIDENT INVESTIGATION AND PREVENTION UNIT CIVIL AVIATION DEPARTMENT

NASSAU, N. P., BAHAMAS

AIRCRAFT ACCIDENT REPORT

COLLISION WITH OBSTACLE WHILE LANDING (CTOL)

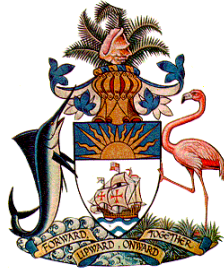
CESSNA 402C

C6-BGJ

Abrahams Bay, Mayaguana, Bahamas

April 04, 2013





**Bahamas Department of Civil Aviation
Air Accident Investigation and Prevention Unit
P. O. Box AP-59244
Lynden Pindling International Airport
Nassau N. P., Bahamas**

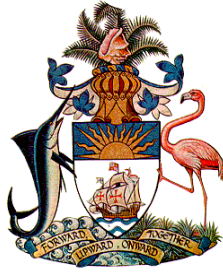
AIRCRAFT ACCIDENT REPORT



**CESSNA 402C
C6-BGJ**

**Collision with Obstacle While Landing
Mayaguana, Int'l Airport, Abrahams Bay, Mayaguana
April 04, 2013**

Abstract: This report outlines the circumstances involving the accident of Lear Charter Service Limited aircraft, C6-BGJ, a Cessna 402C aircraft which was involved in a collision with obstacle (vehicles) while landing at Mayaguana International Airport at Abrahams Bay, Mayaguana, Bahamas on April 04, 2013.



Bahamas Department of Civil Aviation Air Accident Investigation and Prevention Unit

The Air Accident Investigation and Prevention Unit (AAIPU) is a unit within the Flight Standards Inspectorate (FSI), the regulatory unit of the Bahamas Civil Aviation Department (BCAD).

The AAIPU's function is to promote and improve safety and public confidence in the aviation industry through excellence in:

- independent investigation of aviation accidents and other safety occurrences
- safety data recording, analysis and research
- fostering safety awareness, knowledge and action.

The AAIPU does not investigate for the purpose of apportioning blame or to provide a means for determining liability.

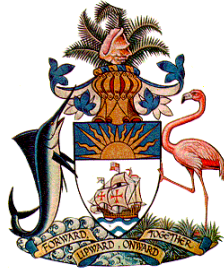
The AAIPU performs its functions in accordance with the provisions of the *Bahamas Civil Aviation (Safety) (Amendment) Regulations (CASAR) 2010, Schedule 19, International Civil Aviation Organization (ICAO) Annex 13* and, where applicable, relevant international agreements.

The Flight Standards Inspectorate established in 2001, is mandated by the Ministry of Transportation and Aviation to investigate air transportation accidents and incidents, determine probable causes of accidents and incidents, issue safety recommendations, study transportation safety issues and evaluate the safety effectiveness of agencies and stakeholders involved in air transportation.

The AAIPU makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations and safety alerts. When the AAIPU issues a safety recommendation, the person, organization or agency must provide a written response within 90 days. That response must indicate whether the person, organization or agency accepts the recommendation, any reasons for not accepting part or all of the recommendation, and details of any proposed safety action to give effect to the recommendation.

Copies of accident reports can be obtained by contacting:

Captain Patrick L. Rolle
Director
Bahamas Department of Civil Aviation
P. O. Box N975
Nassau N. P., Bahamas
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Bahamas Department of Civil Aviation Air Accident Investigation and Prevention Unit

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GLOSSARY OF ABBREVIATIONS USED IN THIS REPORT

When the following terms are used in this report, they have the following meanings;

AAIPU	Air Accident Investigation and Prevention Unit
AGL/agl	Above ground level
AOC	Air Operator Certificate Holder
ARFF	Airport Rescue and Fire Fighting Service
ATC / ATS	Air Traffic Control / Air Traffic Services
CAD	Civil Aviation Department
CASR	Bahamas Civil Aviation (Safety) Regulations (April 17, 2001)
CMI	Continental Motors, Inc., formerly Teledyne Continental Motors
C of A	Certificate of Airworthiness
C of R	Certificate of Registration
DCA	Director of Civil Aviation
DST	Daylight Savings Time (+4 hours to convert to UTC)
FSI	Flight Standards Inspectorate
ICAO	International Civil Aviation Organization
KIAS	knots indicated airspeed
kt	Knot(s)
LBS/lbs	Pounds
MYNN	Lynden Pindling International Airport
MET	Meteorological Office / Department
NM or nm	Nautical Miles
RBPF	Royal Bahamas Police Force
UTC / Z	Universal Coordinated Time / Zulu time

DEFINITIONS

When the following terms are used in this report, they have the following meanings as per CASR 2001 and ICAO Annex 13;

“Aircraft Accident”– means an occurrence associated with the operation of an aircraft which takes place between the time any person boards the aircraft with the intention of flight and all such persons have disembarked, and in which any person suffers death or serious injury, or in which the aircraft receives substantial damage or the aircraft is missing or completely inaccessible.

"Fatal injury" - means any injury, which results in death within 30 days of the accident.

"Incident" - means an occurrence other than an accident, associated with the operation of an aircraft, which affects or could affect the safety of operations.

“Investigation”- A process conducted for the purpose of accident prevention, which includes the gathering and analysis of information, the drawing of conclusions, including the determination of causes and, when appropriate, the making of safety recommendations.

“Serious injury” - means any injury which:

- Requires hospitalization for more than 48 hours, commencing within 7 days from the date the injury was received;
- Results in a fracture of any bone (except simple fractures of fingers, toes, or nose);
- Causes severe hemorrhages, nerve, muscle, or tendon damage;
- Involves any internal organ; or
- Involves second or third degree burns, or any burns affecting more than 5 percent of the body surface.
- Involves verified exposure to infectious substances or injurious radiation.

"Substantial damage" - means damage or failure which adversely affects the structural strength, performance, or flight characteristics of the aircraft, and which would normally require major repair or replacement of the affected component. Engine failure or damage limited to an engine if only one engine fails or is damaged, bent failings or cowling, dented skin, small punctured holes in the skin or fabric, ground damage to rotor or propeller blades, and damage to landing gear, wheels, tires, flaps, engine accessories, brakes, or wingtips are not considered "substantial damage" for the purpose of this Report.

June 5, 2013

Captain Patrick L. Rolle
Director
Bahamas Civil Aviation Department
P.O. Box N-975
Nassau, N.P.,
Bahamas

Sir

I am duty-bound to submit this report on the circumstances of the accident involving C6-BGJ, a Cessna 402C aircraft, registered in the Bahamas and operated by LeAir Charter Service Limited of Nassau, N.P., Bahamas. This accident occurred on April 04, 2013 at approximately 1:00am local time (0500 UTC) at Mayaguana International Airport, Abrahams Bay, Mayaguana, Bahamas and resulted in 3 fatalities of persons on the ground.

This report is submitted pursuant to Part XII, Regulation 80, and Schedule 19 of the Bahamas Civil Aviation (Safety)(Amendment) Regulation (CASR 2010) and in accordance with Annex 13 to the Convention on International Civil Aviation Organization (ICAO).

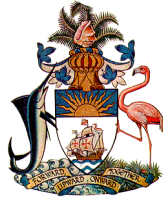
In accordance with Annex 13 to the Convention on International Civil Aviation (ICAO), and Schedule 19 of the Bahamas Civil Aviation (Safety)(Amendment) Regulations (BSAR), the fundamental purpose of such investigations is to determine the circumstances and causes of these events, with a view to the preservation of life and the avoidance of similar occurrences in the future. It is not the purpose of such investigations to apportion blame or liability.

This report contains facts that have been determined up to the time of publication. Information is published to inform the aviation industry and the public of the circumstances surrounding this accident. The contents of this report may be subjected to alterations or corrections if additional factual information becomes available.

Regards



Delvin R. Major
Investigator in Charge
Air Accident Investigation and Prevention Unit
Bahamas Department of Civil Aviation
Lynden Pindling International Airport
Nassau, N. P., Bahamas



BAHAMAS CIVIL AVIATION DEPARTMENT
AIR ACCIDENT INVESTIGATION AND PREVENTION UNIT

TITLE

Registered Owner: Leair Charter Services Ltd.

Operator: Leair Charter Services Ltd.

Manufacturer: Cessna Aircraft Company

Aircraft Type: Cessna Model 402C

Nationality: Bahamas

Registration: C6-BGJ

Place of Accident: Runway 06 at Mayaguana Int'l Airport, Abrahams Bay, Mayaguana, Bahamas

Date and Time: April 04, 2013 at 0500 UTC (1:00am DST)

Notification: DCA, NTSB, ICAO, Cessna Aircraft Company

Investigating Authority: Civil Aviation Department
Air Accident Investigation and Prevention Unit

Investigator in Charge: Delvin R. Major

Releasing Authority: Director of Civil Aviation Department, Nassau, N. P., Bahamas

Date of Draft Report Publication: June 5, 2013

1.0 Factual Information:

1.1 History of the Flight

On Thursday April 4, 2013 at approximately 1:00AM DST (0500 UTC¹) a fixed wing, twin-engine, Cessna 402C aircraft Bahamas registration C6-BGJ, serial number 402C0106, crashed into obstacles (vehicles) while landing on Runway 06 at Mayaguana International Airport (MYMM), Abraham's Bay, Mayaguana, Bahamas.

The pilot in command stated that on April 3, 2013, he received a call at approximately 9:30PM from the Princess Margaret Hospital requesting emergency air ambulance services out of Mayaguana. The local police on the island was contacted to confirm lighting approval and availability in order to conduct the emergency flight. After confirming lighting arrangements with Nassau Air Traffic Control Services, and obtaining the necessary clearance, the pilot in command, along with a copilot and one passenger, (a nurse), proceeded with the flight to Mayaguana. The flight departed Lynden Pindling International Airport at approximately 11:30PM DST (0330 UTC). The destination was Abraham's Bay, Mayaguana, Bahamas.

The pilot in command also reported "about 1 hour and 40 minutes later we arrived at Mayaguana Airport, leveled off at 1500 feet and about 4 miles left base Runway 06, we had the runway in sight via lighting from vehicles." The crew continued with the landing procedures.

The aircraft touch down approximately 300 feet from the threshold on runway 06, the pilot in command reported that prior to the nose gear making contact with the runway "the right wing hit an object (vehicle), causing the aircraft to veer out of control to the right eventually colliding with a second vehicle approximately 300 to 400 feet on the right side (southern) of Runway 06." The impact of the right wing of the aircraft with the second vehicle, caused the right wing (outboard of the engine nacelle) and right fuel sealed wet wing tank to rupture releasing the aircraft fuel in that wing, which caused an explosion engulfing the vehicle in flames. The force of the impact with the second vehicle caused the right main gear to break away from the aircraft and it was flung ahead and to the left side of the runway approximately 200 feet from the point of impact with the truck. As the right main gear of the aircraft was no longer attached, the aircraft collapsed on its right side, slid onto the gravel south (right) of the runway and somewhere during this process, the nose gear also collapsed. The pilot immediately shut off the fuel valve of the aircraft and once the engines and the aircraft came to a stop, the three occupants evacuated the aircraft.

The occupants of the aircraft did not sustain any visible injuries requiring medical attention or hospitalization. However, three (3) occupants of the second vehicle that was struck, were fatally injured. The airplane sustained substantial damages as a result of the impact and post impact crash sequence. The impact with the first vehicle occurred at approximately 427 feet from the threshold of runway 06 and at coordinates 28° 22'30"N and 073° 01'15"W.

The flight was operated on an Instrument Flight Rules flight plan. Instrument Meteorological Conditions (night) prevailed at the time of the accident.

1.2 Injuries to Persons

<i>Injuries</i>	<i>Crew</i>	<i>Passengers</i>	<i>Others</i>	<i>Total</i>
Fatal			3	3
Serious				
Minor/None	1			1

¹ UTC - The 24 hour clock is used to describe the time of day, Coordinated Universal Time (UTC) as particular events occurred.

1.3 Damage to Aircraft

The right wing of the aircraft outboard of the right engine nacelle was destroyed by impact and post impact fire. The right wingtip was found lodged in the cab and windshield of the first vehicle that was struck during landing. The remainder of the aircraft inclusive of the right wing between the fuselage and the engine nacelle, sustained substantial damage. Damages also occurred to the right main gear and nose gear and right engine and propeller due to the impact sequence. The left engine propeller also received damages. The aircraft did not receive any fire damage.

1.4 Other Damage

The first vehicle struck by the aircraft received substantial damage to the cab and windshield. The second vehicle was totally destroyed by the impact with the right wing and the subsequent fire that ensued.

1.5 Personnel Information

1.5.1 Pilot

The pilot in command of the accident aircraft was 48 years old. He is the holder of a valid Bahamas Commercial Pilot Certificate number 377 CPL, with airplane single and multi-engine land, instrument airplane category and class rating with no limitations. He is also the holder of a valid Bahamas First Class medical certificate.

The pilot also holds a USA issued Commercial Pilot license with airplane – single and multi-engine land, and instrument privileges and he holds a USA issued First Class Medical with limitations indicating “Must Wear Corrective Lenses” issued July 2012.

The amount of hours flown by the pilot in command in the last 24 hr, 7 days or the last 30 days prior to the accident is unknown. FAA and CAD records indicate there have been no violations or prior FAA/CAD recorded aviation accident history or violations against him.

1.5.2 Second Pilot

The second pilot of the accident flight, age 42, is the holder of a valid Bahamas Commercial Pilot Certificate number 409 CPL, with airplane single and multi-engine land and instrument airplane ratings. He also holds a valid Bahamas and USA First Class Medical certificate issued July 2012.

The amount of hours flown by the second pilot in the last 24 hours, 7days, and 30 days prior to the accident, are unknown. FAA and CAD records indicate there have been no violations or prior FAA/CAD recorded aviation accident history or violations against him.

1.6 Aircraft Information

1.6.1 General

Aircraft C6-BGJ a Bahamas registered Cessna 402C aircraft was manufactured in 1978 by Cessna Aircraft Company and designated serial number 402C0106. The aircraft was fitted with two (2) reciprocating engines, model number TSIO-520-VB manufactured by Teledyne Continental Motors. The aircraft was listed in the normal category, standard classification. The Flight Standards Inspectorate, Nassau, Bahamas, issued an Airworthiness Certificate for the aircraft on 31 January 2013.

The accident airplane is configured with 10 seats, 2 pilot’s seat, and eight (8) additional seats. Four of the eight passenger seats are single seats and 2 sets of seats are double seats, which are positioned near the entrance door and designated seats 7, 8 and 9, 10. The airplane has a main entry door, which is located on the left side of the

aircraft, aft of the left wing and adjacent to seats 7 and 8. There are two emergency exits, one located forward and above the left wing, next to the pilot's seat (seat 1) and one at seat 4 (which is located behind the co-pilot's seat) on the right side of the aircraft, above the right wing.

The aircraft also has a cargo door on the left side aft of the left wing, which is joined to the main entry door and adjacent to seats 9 and 10 just forward of cargo area Bay A.

The cabin cargo storage area began just aft of seats 9 and 10 and is designated cargo areas Bay A and Bay B. Cargo areas are also located in each wing lockers aft of each respective engine nacelles. Additionally, cargo or bags can also be carried / stored in the Nose Luggage and Avionics Bay area of the aircraft above the nose wheel storage compartment.

As this particular flight was designated a lifeguard / emergency flight, single seats number 3, 5, and double seats 7, 8 were removed to allow the use of a stretcher for the patient.

1.6.2 Aircraft Description

The Cessna 402C is a twin engine, all metal, low wing airplane with retractable tricycle landing gear. The fuselage is of semi-monocoque² construction: the wing, tailplane and fin are of conventional aluminum construction. The aircraft can be configured for either passenger or freight transport. In the passenger role, the two forward seats are pilot's seats. A maximum of eight (8) passenger seats may be installed aft of the pilot seats. Minimum flight crew required is one (1) pilot.

1.6.3 Engines

The Cessna 402C is powered by two Teledyne Continental Motors model TSIO-520-VB engines, which are turbo, charged, fuel injected, direct drive, air-cooled and horizontally opposed with six cylinders each with a 520 cubic inch displacement. It is rated at 325 horsepower at 2700 propeller rpm and 39.0 inches hg manifold pressure to the critical altitude of 12,000 feet. Each engine is provided with an oil pump, fuel pump, vacuum pump, propeller governor, tachometer generator, starter and alternator.

1.6.4 Propellers

Propellers installed on the Left and Right engines of C6-BGJ, were manufactured by McCauley Accessory Division Cessna Aircraft Company. The types of propellers were all metal, three-bladed, constant speed, full feathering, single acting, non-reversible, hydraulically actuated, governor regulated propellers. Each propeller utilizes oil pressure, which opposes the force of springs and counterweights to obtain correct pitch for engine load. They were both part number 0850334-29 and had an operating limit of 2700-rpm maximum speed.

Propeller Serial number 797444 was installed on the left engine and serial number 7910272 was installed on the right engine of C6-BGJ. The left propeller was installed on May 27, 2011 and TSO (Time Since Overhaul) was 966.3 hours. The right propeller was installed on October 27, 2011 and TSO was 847.8 hours.

The engine and propeller controls are conventional in that; three levers [1. Throttle. 2. Propeller and 3. Mixture], are mounted on the control pedestal and controls each engine in pairs in the order 1, 2, and 3 from left to right. The **Throttle control** lever is used to increase or decrease the engine power by moving the butterfly valve in the fuel air control unit. The **Propeller control** lever is used to change the propeller pitch to maintain or set a desired engine rpm. The **Mixture control** lever is used to control the amount of fuel to be metered by the fuel-air control unit.

² Monocoque is a construction technique that supports structural load by using an object's exterior, as opposed to using an internal frame or truss that is then covered with a non-load-bearing skin or coachwork.

1.6.5 Flight Controls

The flight control consists of the ailerons, elevators and rudder and their respective trim systems. All of these systems are constructed of aluminum and are statically balanced.

Each aileron is attached to the rear main wing spar at two points. The aileron is actuated by a bell crank, which is attached to a wheel in the wing. Cables attached to the pilots control wheel actuate the wheel. When the rudder is actuated, a spring assembly, interconnected to the aileron system, causes the ailerons to automatically assist the turn. A trim tab attached to the left aileron with a full-length piano type hinge achieves aileron trim. The trim tab is actuated by a push pull rod, which is attached to a jackscrew type actuator in the wing. Cables attached to the trim control knob on the cockpit control pedestal drive the actuator. The aileron trim tab also acts as a servo tab so that aerodynamic forces on the tab will move the ailerons to the selected position, which reduces the forces required to activate the ailerons in flight.

The rudder is attached to the vertical stabilizer rear main spar at three points. A bell crank attached to the bottom of the rudder actuates the rudder. Cables attached to the cockpit rudder pedals actuate the bell crank. When the rudder is actuated, a cable and spring assembly that is connected to the aileron system causes the ailerons to automatically assist the turn. The rudder trim is achieved by a trim tab attached to the lower half of the rudder with a full-length piano type hinge. The trim tab is actuated by a push-pull rod, which is attached to a jackscrew type actuator in the vertical stabilizer. Cables attached to the rudder trim wheel on the cockpit control pedestal drive the actuator. The rudder trim tab also acts as a servo tab so that aerodynamic forces on the tab will move the rudder to the selected position, which reduces the forces required to activate the rudder in flight.

A torque tube connects the elevator control surfaces. The resulting elevator assembly is attached to the rear spar of the horizontal stabilizer at six points. The elevator assembly is actuated by a push pull rod, which is attached to a bell crank in the empennage. Cables attached to the pilots control wheel actuate the bell crank. An elevator trim tab attached to the right elevator with a full-length piano-type hinge achieves elevator trim. The trim tab is actuated by a push pull rod, which is attached to a jackscrew type actuator in the horizontal stabilizer. Cables attached to the trim control wheel on the cockpit control pedestal drive the actuator.

1.6.6 Aircraft Fuel System

The fuel system consists of two main tanks outboard of each engine, two fuel selector valves and emergency shutoff valves and necessary components to complete the system. The main fuel tanks are an integral portion of the sealed wet wing. These tanks supply their respective engine with fuel for normal operations including takeoffs and landings. An auxiliary fuel pump, located outside the tank, provides fuel pressure for priming during engine start. In the event of an engine fuel pump failure, the auxiliary fuel pump will supply fuel to the engine if the auxiliary fuel pump switches are on.

There are two fuel selector valves controlling fuel supply to the engines. They are located in the wings and are operated by cables from selection knobs situated on the cockpit floor between the pilots' seats. Each valve has three selection positions; OFF, LEFT MAIN AND RIGHT MAIN.

Normally each engine is fed from its own tank, i.e. left engine from left tank, but the valves allow an engine to be fed from the opposite tank. This is referred to as "cross-feed". The mechanical detents, which provide positive positioning of the valves in their three functioning positions, are built into the valves. The knobs in the cockpit can themselves move freely but they are constrained by the detents through the cable system.

There is also an emergency shutoff control adjacent to and immediately behind the fuel selector controls. Its function is to isolate the fuel cross-feed lines from the fuel tanks in the event of fire or landing with the gear retracted. C6-BGJ, a 402C aircraft was approved for 100 (formerly 100/130) Grade Aviation Fuel (Green) and as an alternate, 100LL Grade Aviation Fuel (Blue). It has a total fuel capacity of 213.4 (U.S. Gallons) and 204.0 Usable Fuel (U.S. Gallons).

1.7 Meteorological Information

Weather observations are transmitted in coordinated universal time / Zulu time (UTC / Z). Daylight Savings Time is 5 hours behind UTC / Z time. Bahamas Meteorological Department at the Lynden Pindling International Airport provided general weather conditions in the vicinity of Mayaguana Island between Wednesday 0300UTC and Thursday 0600UTC. The Bahamas Area Forecast valid for the period and area under investigation was reported as follows:

Special Features: High pressure ridge over the Bahamas. Significant weather: Over the Bahamas Few to Scattered clouds between 2,000 feet and 2,500 feet. Scattered to Broken clouds around 22,000 feet. Slight chance of isolated showers. Brief MVFR conditions also reported.

Surface winds for Central and Southeast Bahamas: Forecast to be easterly 15 knots.

Winds at 2,000 feet: Forecast to be easterly at 12 knots in the central Bahamas and easterly at 15 knots in the Southeast Bahamas.

Observed surface winds at Matthew Town Inagua Bahamas for 0600UTC: East at 1 knot. Satellite pictures at 30 minute intervals between 0245UTC and 0515UTC showed few clouds throughout the period.

1.8 Aids to Navigation

No discrepancies with navigational aids were known or reported.

1.9 Communications

No difficulties with communications were known or reported.

1.10 Aerodrome Information

Mayaguana International Airport (IATA: MYG, ICAO: MYMM) is a Government owned airport in Mayaguana, the most easterly island and district in the Bahamas. It has an airport elevation of 11 feet above mean sea level. The coordinates are 22° 23'01.65" N and 073° 01'57.13"W. This Airport is served by one Runway 06/24 which is oriented Southwest and Northeast. The dimensions of Runway 06/24 available for landing and takeoff are published to be 4600ft long and 50 feet wide due to reconstruction underway.

The rescue and firefighting equipment is limited to fire extinguishers. Customs and Immigration is available at the airport allowing for international flights.

1.11 Flight Recorders

C6-BGJ was not fitted with a flight recorder, as none was required by regulations for this type of aircraft.

1.12 Wreckage and Impact Info

1.12.1 General Wreckage Description

The airplane sustained substantial damage to the right wing outboard of the right engine nacelle. The right main and nose gear, the right engine and both engine propellers sustained substantial damage.

The right sealed wet wing fuel tank ruptured during the crash sequence; which allowed all fuel in it to escape aiding in the fireball that engulfed the second vehicle that was struck during the landing roll.

A complete survey of the accident scene and aircraft structure was accomplished; however, the severity of the fire damage precluded a complete accounting of all the aircraft structure. The entire right wing outboard of the right engine nacelle minus the right wing tip, was destroyed beyond recognition by the fire.

1.12.2 Fuselage

The fuselage of the aircraft did not sustain any noticeable damage.

1.12.3 Engines and Propeller

Both engines were Teledyne Continental Motors model TSIO-520-VB. The left engine and propeller remained attached to the left wing, which was still attached to the fuselage however the propeller had sustained substantial damage. The right engine and its propeller were also still attached to the right wing that remained post accident both engine and propeller received substantial damage. Preliminary inspection of both engines and pilot interviews revealed no evidence of pre-impact malfunction.

1.12.4 Wings

The fire destroyed the right wing outboard of the right engine nacelle, including right wing leading edge, trailing edge and flap. The right wingtip and strobe light had separated as a unit and was lodged in the passenger cab of the first truck that was struck. The left wing with engine and propeller still attached, remained attached to the fuselage and exhibited no noticeable damage.

The landing gear lever was found in the down and locked position. The gear selector handle on the instrument panel confirmed that the gear was indeed selected to the down position. No impact damages were noted to the left main landing gears. The nose landing gear was attached to the fuselage and had collapsed during the crash sequence. The right landing gear was found on the left side of the runway approximately 200 feet upwind diagonally from where impact was made with the second vehicle.

1.12.5 Empennage and Flight Controls

The left aileron of C6-BGJ received no damage in the accident. The right aileron was found on the left side of the runway approximately 100 feet across from where impact was made with the second vehicle.

The vertical stabilizer, rudder and rudder trim tab remained attached to each other and the fuselage; these surfaces exhibited no evidence of impact or post impact damage.

The left and right horizontal stabilizer and elevator remained attached to each other and the vertical stabilizer. They exhibited no impact or post impact damage.

1.12.6 Fuel Selection

Both fuel selector valves were found in the "OFF" position. The fuel cutoff valve was found in the UP / Cutoff position. The pilot accomplished this action after the explosion post impact with the second vehicle.

1.13 Medical and Pathological

The complete intact bodies of the three persons occupying the second vehicle were not recoverable due to post impact explosion and fire. What remained was recovered and transported to the Morgue at the Princess Margaret Hospital for forensic identification.

1.14 Fire

An explosion resulted when the second vehicle was struck after landing. The right wing and its sealed wet wing fuel tank ruptured on impact with the second vehicle. As a consequence an explosion occurred. The second vehicle with its occupants as well as the right wing of the aircraft, were burnt beyond recognition

1.15 Survival Aspects

1.15.1 First Aid

Reports indicate that fire extinguishers positioned at the airport were unserviceable and that there was no fire truck available at the airport.

The second vehicle remained engulfed in flames for approximately 2 hours. It was reported that a construction water truck was used to render assistance. The water truck, however, was not stationed at the airport and by the time it was located, refilled with water and arrived at the airport; approximately 2 hours' time had elapsed.

With the assistance of drain pumps, what remained of the fire was extinguished. Due to the intensity, extent and duration of the fire, first aid to victims was not possible. All victims were burned beyond recognition.

2.0 Analysis

2.1 Overview

2.1.1 Flight reconstruction

There was no radar or navigation system data with which to reconstruct the flight path and so, an approximation was compiled based on the recollection of the crew and numerous eyewitness reports. All reports seemed to be consistent with each other.

The pilot in command and second pilot were properly qualified and certificated to operate the airplane on this flight. No evidence was found that either pilot experienced any behavioral or physiological impairment at the time that could have caused or contributed to the accident.

2.1.2 Wreckage Analysis

The aircraft was in the correct configuration for flight. It had gear and flaps extended. Prior to touchdown of the nose gear on the runway, the crew reported that they felt they hit something and was not sure what it was until after hitting the second vehicle, coming to a stop and investigating the fire that resulted, only then did they realized that two (2) vehicles were involved.

The right wing outboard of the engine nacelle was totally destroyed by the intensity of the fire. The right gear was detached and flung on the opposite side (left) of the runway, approximately 200 feet diagonally, ahead of the aircraft at the point of impact with the second vehicle. Also, during the impact with the second vehicle, the right aileron also became detached from the aft, outboard right wing and flung across the runway to the left side approximately 150 feet from the impact with the second vehicle. The nose gear collapsed during the sequence of events. Both propellers were damaged as a result of the accident. The fuselage of the aircraft did not appear to receive any significant damaged by the crash sequence. The aircraft came to rest approximately 300 feet from the impact with the second vehicle approximately 40 feet from the edge of the runway, on the south side on a heading of approximately 120 degrees.

Both fuel selector valves were found in the "OFF" position and the fuel cut off selector was found in the cutoff position selected intentionally by the pilot after the second vehicle was struck.

The post impact fire did not affect the aircraft.

2.2 CAD Oversight

CAD / FSI mandate is surveillance of certified AOC as per CASR 2001 Schedule 12. As Leair Charter Service was an AOC holder, continued surveillance by CAD/FSI was conducted. No evidence was found to show any non-compliance with the BASR by either Leair Charter Service or either of the pilots.

2.3 Summary

The experienced and competent pilot was confronted with an unenviable emergency at a critical stage of flight. The expectation was to land, roll out and make a safe departure. It was not expected that vehicles would be positioned so close to the runway to become an obstruction or hazard.

3.0 Conclusions

(a) Findings

1. The airplane was issued a Certificate of Airworthiness on January 31, 2013 by the Bahamas Flight Standards Inspectorate,
2. The airplane maintenance records were reviewed; evidence exists to demonstrate that the airplane was being maintained in accordance with Bahamas Civil Aviation Regulations.
3. Investigations revealed that the Civil Aviation Department provided adequate surveillance of Leair Charter Service.
4. Investigations revealed no history of violations or other enforcement actions were taken by the Civil Aviation Department against Leair Charter Service or either pilots.
5. Weather was not a factor in the accident.
6. ATC was not a factor in the accident.
7. The main reason for this flight at night was to evacuate a patient, determined to be gravely ill by the medical personnel at Mayaguana.
8. The airport was not served with permanent runway lighting.
9. The aircraft landed on runway 06 at Mayaguana Int'l Airport
10. At the time of the accident, a NOTAM was in effect published by the Aeronautical Information Services office, indicating: "With Immediate Effect Airmen are advised that the first 2,500 feet on approach end Runway 24 at MYMM closed for reconstruction. 4,800 feet available for landing and takeoff. Reconstruction on the 7,300 feet Runway will be done in stages. Closed runway section cordoned off by orange flags. Men and equipment will be removed from Runway for aircraft takeoff and landing. Airmen are exercise caution and overfly airport before landing."
11. Field investigation measurements revealed that the useable width of the runway at the point where the aircraft and first vehicle collided was 42 feet.
12. The wingspan of the aircraft was 44.12 feet. The wing of the aircraft (provided that aircraft did land in the exact center of the runway) would therefore extend beyond the width of the runway by at least 3 feet. With the vehicle parked 8 inches from the edge, inadequate wingspan clearance existed.
13. The right wingtip of the aircraft struck the first vehicle separating the wingtip (approximately 3 feet x 2 feet) from the wing and becoming lodged in the cab and windshield of the vehicle that it struck.
14. Two vehicles were parked too close to the active runway. Measurements uncovered that both vehicles were parked 8 inches from the useable runway edge.

15. The airport did not have an approved plan or guidance for the use of vehicles to provide lighting during nighttime or an emergency at night.
16. An improvised plan was developed to use vehicles to execute this maneuver in an attempt to provide lighting for the aircraft.
17. It could not be determined who initiated or developed this improvised plan that was used.
18. It could not be determine who was in charge of the improvised plan. Investigations have revealed that numerous persons were giving instructions on how the plan would go; apparently those persons were not coordinating with each other.
19. No one verified participants in the maneuver were in the appropriate location prior to the initiation of the landing sequence.
20. As the aircraft veered to the right from the first impact, the second vehicle felt the brunt of the entire right wing rupturing the right wing sealed wet wing fuel tank and as reports that the engine of the vehicle was still operating, this may have contributed to the ignition of the fuel and the fireball that ensued.
21. The second truck, when struck, was dragged approximately 25 feet from the position it occupied (next to the runway) when it was struck initially to the position it occupied after the wing separated from the aircraft.
22. The airport has 5 fire extinguishers located at the terminal, however, no one used them or attempted to use them to aid in extinguishing the blaze. No one was able to provide an answer as to why the use of either of the fire extinguishers was not considered during the fire. A post-accident investigation reveals the serviceability of the extinguishers as questionable.
23. As the airport did not have a fire truck available, a water truck that was used for construction was located and able to provide assistance, however it arrived approximately 2 hours after the fire had started and was not able to aid in rescue of persons in the vehicle.

(b) Causal Factors

1. Breakdown in communication during the planning and execution of an unapproved procedure has been determined to be the probable cause of this accident.
2. Other contributing factors:
 - a. Use of an unapproved procedure to aid in a maneuver that was critical
 - b. Too many persons were planning the maneuver and not coordinating their actions.
 - c. Failure of planners of the maneuver to verify whether participants were in the right position
 - d. Inexperienced persons used in the execution of a maneuver that was not approved.
 - e. Vehicle parked too close to the side of the runway
 - f. Vehicle left with engine running while parked near the runway

4.0 Recommendations:

As a result of this investigation, the AAIPU made the following recommendations to the Department of Civil Aviation:

1. Install temporary runway lighting at all airports not served by fixed runway lighting so that in the event of future emergencies at night, a better way to provide lighting would be available to the pilots.
2. Prohibit the use of vehicles on an airport surface to provide lighting at night.
3. Should the prohibition of vehicles and / or installation of temporary lighting not be feasible, a plan should be developed, tested and made available for use to all airport personnel at airports that do not have fixed or temporary lighting available.
4. An individual or position should be named at all airports where this plan is to be used to verify who is in charge, who will participate and who will verify the safety of vehicles prior to the arrival of the aircraft and the execution of the maneuver.
5. If a plan is developed, this plan should be made available to all AOC holders and posted at all airports for all pilots to be familiar with.