NATIONAL TRANSPORTATION SAFETY BOARD
Office of Aviation Safety
Washington, DC 20594

AIRWORHTINESS GROUP CHAIRMAN'S FACTUAL REPORT

May 1, 2012

A. ACCIDENT

Operator	:	SK Logistics d.b.a SK Jets
Aircraft	:	Bell Helicopter 206BIII [N5061M]
Location	:	Green Cove Springs, FL
Date	:	December 26, 2011
Time	:	0554 EST
NTSB #	:	ERA12MA122

B. AIRWORTHINESS GROUP

Group Chairman: Jose Luis Obregon
National Transportation Safety Board
Miami, Florida

Member: Robert Hendrickson
Federal Aviation Administration
Washington, DC

Member: Michael Herman
Federal Aviation Administration
Fort Worth, Texas

Member: Bill Sarles
Technical Advisor to Transportation Safety Board of Canada
Bell Helicopter
Fort Worth, Texas

Member: David W. Riser
Rolls-Royce Corporation
Indianapolis, Indiana

C. SUMMARY

On December 26, 2011, at 0554 eastern standard time, a Bell 206B, N5016M, operated by SK Logistics, d.b.a. SK Jets, collided with terrain while maneuvering near Green Cove Springs, Florida. The certificated airline transport pilot and 2 passengers (a doctor and a medical technician) were fatally injured. The on-demand air taxi flight was conducted under the provisions of 14 Code of Federal Regulations Part 135. Night instrument meteorological conditions prevailed along the route and no flight plan was filed for the planned flight to Shands Cair Heliport (63FL), Gainesville, Florida. The flight originated from Mayo Clinic Heliport (6FL1), Jacksonville, Florida, about 0537.

The Airworthiness Group was formed to record and document the information regarding the helicopter wreckage and maintenance records. The group began its investigation on December 27, 2011, at the accident site and concluded the on-scene portion of the investigation on December 28, 2008. The group reconvened on December 29, 2011, in St. Augustine, Florida to examine the helicopter's maintenance records at SK Jet's facility; on January 10, 2012, in Griffin, Georgia, to examine the recovered wreckage at Atlanta Air Recovery and Storage, Inc.; and on January 18, 2012, in Indianapolis, Indiana, to examine the Allison Engine Company, 250-C20J engine, at Rolls–Royce's facility.

D. DETAILS OF THE INVESTIGATION

1.0 WREACKAGE DISTRIBUTION

The wreckage was located in a sparsely populated pine tree forest area located in the vicinity of Green Cove Springs, Florida. The helicopter collided with a 50-foot tall tree at an estimated height of 30 feet above the ground, in a level attitude on a heading of 172 degrees magnetic, and the majority of the helicopter was consumed by a postcrash fire. The crash debris line (CDL) covered an area 320 feet long by 70 feet wide. From the initial tree strike to the final tree strike was about 175 feet. The cockpit and other items extended about 130 feet beyond the main crash site location. Pieces of the chin bubble and airframe skin was present along the CDL from the initial tree strike to the main wreckage. Numerous trees along the CDL were hit by the helicopter as it descended.

A large piece of the tail boom was located about 110 feet down the CDL along with the aft cross tube. The toe of the right main skid was located about 10 feet forward of the aft cross tube. Both rear cabin doors were located a few feet beyond the tail boom and right skid followed by the cockpit doors. All of the items were located within 10 feet of the CDL. The main rotor hub with about half of the main red rotor blade still attached was located 8 to 10 feet forward of the cockpit doors. One of the tail rotor blades was located 25 feet right of the CDL and 128 feet down the CDL. The tail rotor gear box and the vertical fin were to the left of the CDL and located 10 to 12 feet from the red main rotor blade. A few feet further, were the remnants of the fuel tank, one boost pump, and a fire extinguisher normally located in the cockpit area. Twelve feet further was the remainder of the helicopter laying on its left side with the nose section against a tree on a heading of 350 degrees magnetic. The flight controls were separated from the helicopter and were located beyond the main wreckage. The pilot

and co-pilot seats, instrument panel, occupant seats, white main rotor blade sleeve, and several cockpit related items were located beyond the main wreckage.

Photo1: Initial Tree Strike

Photo 2: Descending Tree Strikes

Photo 3: View of the Wreckage Debris

Photo 4: View of Wreckage Site

2.0 AIRCRAFT DESCRIPTION AND HISTORY

The Bell 206 B III is a single pilot, five place, single engine, light helicopter with a two-blade, semirigid, main rotor and tail rotor for directional control. The landing gear is a tubular skid type made of aluminum alloy. The helicopter has four large doors, two located on either side of the helicopter, to provide entrance and exit for the pilot and passengers. The two-bladed main rotor is mounted on the main gearbox, which is directly above the cabin. The Allison, 250-C20J, engine is coupled to the transmission through a freewheeling unit and a main driveshaft. The transmission is mounted on the cabin roof forward of the engine. The transmission provides reduced engine rpm and distributes torque upward to drive the main rotor and aft through the tail rotor gearbox to drive the

tail rotor. The helicopter was equipped with two front seats with dual flight controls and a rear bench seat for 3 individuals. The instrument panel extends across the front of the cockpit. An overhead console, centered on the cabin roof, and a floor mounted pedestal. A caution panel located across the top of the instrument panel provides cautions and warnings of systems. The helicopter was equipped with an air conditioning system, a chin bubble system, and an extend fuel tank system under a supplemental type certificate.

Photo 5: N5016M

The navigation equipment consisted of an electrically driven directional gyro, a course deviation indicator VOR with localizer and glade slope, a standby compass, and a, visual flight rules only, Garmin 430 GPS. The helicopter was certified for visual flight rule only.

Photo 6: Instrument Panel

The helicopter records indicated that N5016M, serial number 2636, was manufactured in 1979, and a normal airworthiness certificate was issued by the Federal Aviation Administration in 1979. The helicopter was purchased by Abraham Holdings, LLC in May 2001, and leased by SK Jets in December of 2011. At the time of the accident, N5061M had flown an estimated 11,176 total flight hours.

3.0 AIRCRAFT INFORMATION

A conformity inspection was conducted on December 1, 2011, for the Title 14 Code of Federal Part 135 operation. The conformity inspection was completed on December 19, 2011, and N5016M was placed on SK Jets operating certificate. For more details see Attachment 1.

A review of the aircraft records revealed that the helicopter had accumulated 11,174.70 total flight hours before the accident flight.

The accident flight route was approximately 0.9 hours, which would have resulted in an aircraft total time (ACTT) of approximately 1175.60 at the time of the accident. The last 100-hour airframe and engine inspection was accomplished 4.7 flight hours prior to the accident flight on August 23, 2011, at an ACTT of 11,170.10. The last recorded Pitot/Static and Transponder inspections were accomplished on December 16, 2011, at an estimated aircraft total time of 11,169.00.

The engine, had accumulated 11, 220.4 hours at the time of the accident, and was overhauled by Standard Aero on March 20, 2005. The total time at the time of the overhaul was 11,053.5 hours. The engine was converted from an M250 C20B to an M250 C20J during the last overhaul. The engine had accumulated 167.1 hours since the overhaul. A 100-hour inspection was performed on August the 23, 2011, at a total engine time of 11, 215.8 hours.

3.1 WEIGHT AND BALANCE

The helicopter was last refueled on morning December 26, 2011, with 35 gallons of Jet A fuel. With 58 gallons (394 pounds) of Jet A fuel at the time of departure, plus the weight and balance based on the helicopter's empty weight, one pilot, two passenger at 200 pounds each, and estimated weight of baggage and equipment, the helicopter was within the weight and balance limitations with a useful load of 1,300 pounds. It was not determined if the pilot calculated a weight and balance for the accident flight. For more details see Attachment 2.

3.2 FUSELAGE/COCKPIT

The majority of the airframe and the transmission was consumed by the postcrash fire. The center console and all instrument gauges were fire damaged. Fragments of windscreen, left and right chin bubble, and over head green house were located along the CDL. The forward and aft cabin seats and restraint systems were consumed by fire. Aft cabin doors were consumed by fire. Continuity of the flight controls could not be

confirmed due to the post crash fire. The cyclic and collective controls were separated along with the anti torque pedals. The pilot's anti torque pedals were located past the first piece of the tail boom. The copilot's ant torque pedals were located to the right and forward of the main wreckage. .

Photo 7: Remnants of the Fuselage and Cabin Areas

The following instruments and navigation/communication, condition and position/reading are in Tables 1 and 2:

Tablet 1: Instruments		
Directional Gyro	Destroyed	-
Altimeter	Impact & Thermal Damaged	Baro Window at 30.22
Vertical Speed Indicator	Impact & Thermal Damaged	unreliable
Turn & Bank Indicator	Impact & Thermal Damaged	Left Turn
Attitude Indicator	Impact & Thermal Damaged	10 degrees nose above the horizon
Standby Compass	Impact & Thermal Damaged	unreadable
Main Rotor / Engine Speed RPM	Impact & Thermal Damaged	unreadable
Fuel Quantity Indicator	Impact & Thermal Damaged	unreliable
Engine Oil Pressure	Impact & Thermal Damaged	unreliable
Airspeed	Impact & Thermal	unreliable

	Damaged	
Engine Temperature	Impact & Thermal Damaged	unreadable
% RPM Gas Producer	Impact & Thermal Damaged	14 percent
Turbine Out Temperature	Impact & Thermal Damaged	unreadable

Tablet 2: Navigation / Communication		
Intercom Control Unit	Impact & Thermal Damaged	Selector to Pilot ISO Position
Bendix/King, KMAA24H	Impact Damaged	Com 1 knob, HF Comm 1 & 2, Nav, & DME selected
King, KY 196 TSO, Radio Digital	Impact Damaged	Digital
Garmin GTX 328, Digital Transponder	Impact &Thermal Damaged	Digital
Garmin 430 GPS	Impact &Thermal Damaged	Digital

Photo 8: Instrument Panel

3.3 MAIN TRANSMISSION AND ROTOR SYSTEM

The majority of the transmission was consumed in the post crash fire, exposing the planetary gears, ring gears, and the sun gear.

Photo 9: Transmission Assembly

The main rotor blades were damaged and the main rotor hub remained attached to the red blade yoke. The red blade spar was separated into three sections and the leading edge exhibited bending. Yellow paint transfer marks were present near the tip of the rotor blade. The tip cap was intact.

Photo 10: Red Blade

The white main rotor blade was damaged and exhibited yellow paint transfer about 4 feet from the rotor blade tip. The outboard 10 to 15 inches of the afterbody from the red and white main rotor blades separated from their blade spars, leaving a 45-degree tear where the sections attached.

Photo 11: White Blade

3.4 FLIGHT CONTROLS

The collective pitch jack shaft was wrapped around a tree with the engine, transmission, and oil cooler, which extended beyond the tree on a heading of 170 degrees magnetic. The cyclic and collective controls were separated from the system along with the anti torque pedals, which were located forward past the first piece of the tail boom and the co-pilots tail rotor controls. The broom closet had been consumed by fire. All control tubes exhibited evidence consistent with overload failure and some tubes were also crushed. The pitch change links were broken off at the clevis and the swash plates were fused together.

Photo 12: Flight Controls

Photo 13: Swashplate Assembly

3.5 TAILBOOM

The majority of the tail boom was consumed by post crash fire and located next to the engine assembly. A torn section of the tailboom was located on the ground under trees along the CDL.

Photo 14: Tailboom

3.6 TAIL ROTOR DRIVE SYSTEM

All tail rotor drive shaft segments with Thomas couplings extending reward from the short shaft to the 90-degree gear box separation. Some segments were not located and were probably consumed by the post crash fire. The remaining drive shaft segments

exhibited evidence of overload signatures. Both tail rotor blades separated from the 90-degree gear box and exhibited characteristics consistent with low speed at impact.

Photo 15: Tail Drive Shaft

Photo 16: Tail Rotor Assembly

3.7 FUEL AND HYDRAULIC SYSTEMS

Both fuel boost pumps were recovered along with remnants of the fuel bladder and the goose neck from the extended fuel tank. The fuel filler cap was located and was secured in the locked position. Remnants of the three hydraulic servo actuators were located. The actuators positions were unreadable due to thermal damage. The respective connecting bolts, with cotter keys, were in their respective location. The hydraulic fluid filter was observed with heat exposure.

Photo 17: Fuel Boost Pumps and Remnants of Fuel Bladder

Photo 18: Fuel Filler Cap

Photo 19: Hydraulic Servo Actuators

Photo 20: Hydraulic Fluid Filter

3.8 LANDING GEAR

The right landing gear skid tube was spread out with both forward saddles toed-in and having a downward vector. Both toes separated at the rivet line forward of the forward cross tube. The forward cross tube was cantered aft. Both skid tubes separated from the landing gear assembly at the aft rivet line of the forward saddle and from the forward rivet line of the aft saddle. The heels remained attached to the aft saddles and aft cross tube. The aft cross tube was bent aft.

Photo 21: Main Landing Skid System.

3.9 POWERPLANT

The engine was located approximately 170 feet downstream in the debris field, was oriented in a northerly facing direction and was positioned on its left side. The engine was fire damaged. The accessory gear box had been consumed by fire. All engine fuel, oil and pneumatic lines had sustained damaged. The compressor remained in position supported by the left and right side compressor air discharge tubes and the spur adapter gear shaft. The bleed valve had been consumed by fire. The compressor inlet guide vanes were crushed. The first stage compressor blades and second stage stator vanes revealed no visible damage. The compressor scroll remained in position and had burned through near the left shoulder area. Both left and right side compressor air discharge tubes were in position and properly seated. The right side air tube appeared normal while the left side exhibited crushed and burn damage along its length. The exhaust collector remained in position with no visible external impact damage. Both exhaust stacks remained attached to the exhaust collector with the left side displaying crush damage and the right side displaying both crush and tearing damage. The turbine module remained in position. The thermocouple harness remained in position as did the No. 6/7 bearing external oil sump can. The outer combustion case was in position and displayed denting to the dome and top areas. A puncture hole was present just forward of the left shoulder area. The fuel nozzle and igniter were both in position. The fuel control unit was present and supported only by remaining tubing with the mounting flange. The forward portion of the housing had burned away. The power turbine governor, fuel pump and oil pump were consumed by fire.

The engine was recovered from the accident site and shipped to the manufacturer's facility for a teardown examination under the supervision of the NTSB.

Photo 22: Engine at Accident Site

3.9.1 ENGINE

Manufacturer	Allison Engine Company
Engine Model	250-C20J
Rating:	420 Shaft Horsepower
Serial Number	CAE 823037
Engine Total Hours	11220.4

Component	Serial Number	Part Number	TSO	Total Time	Condition
Engine CAE	823037	6899400	167.1	11220.4	Damaged
Gearbox	CAG 35201	23001923	167.1	13183.8	Destroyed
Compressor	CAC 40337	6890550	167.1	12750.1	Damaged
Turbine CAT	CAT 80159	23038241	167.1	4453.5	Damaged
Fuel Control	BR58697	23070606	New	167.1	Destroyed
Governor	BR45361	23076061	New	167.1	Destroyed
Fuel Pump	JG04AKV1286	23070459	New	167.1	Destroyed
Fuel Nozzle	AG59251	23077068	167.1	Unknown	Damaged
Bleed Valve	RG15060	23053176	167.1	Unknown	Damaged

4.0 MAINTENANCE RECORDS

The rotorcraft maintenance records revealed that the helicopter was being maintained in accordance with the manufacturer's recommended maintenance program that consisted of regularly scheduled inspections, parts replacements, and checks. This aircraft was being maintained in accordance with Bell Helicopter's recommended Maintenance Service Requirements, which encompasses all inspections, overhaul intervals, and retirement items. The requirements for inspections, overhauls, retirement of components, Airworthiness Directives, Service Bulletins, and survival equipment requirements are tracked by a computer database. The inspections occur at intervals for

standard inspections and are listed by component named for individual inspection/maintenance requirements. For more details see Attachment 3.

5.0 TESTS AND RESEARCH

5.1 MAIN ROTOR MAST

The main rotor mast, upper end, was submitted to the Materials Laboratory for examination. The mast was heavily deformed and bent above the fracture. Magnified examination of fracture revealed large overstress shear lips completely around the mast. The orientation of the shear lips and the overall pattern of deformation were consistent with a bending overstress separation. No indications of torsion were noted in the fracture. (Refer to Material Laboratory Factual Report Number 12-015)

5.2 ANNUNCIATOR PANEL

The annunciator panel from the accident aircraft was submitted to the Materials Laboratory for examination of the light bulb filaments. The annunciator panel was x-rayed to determine the condition of the filaments inside each individual indicator light. Radiographs of the filaments in all of the indicators showed that the several of the bulb filaments were fractured; however, all of the filament material was present and exhibited no signs of stretching. The bulbs with intact (unbroken) filaments also showed no signs of filament stretching. (Refer to Materials Laboratory Factual Report Number 12-037)

5.3 ALLISON ENGINE COMPANY, 250-C20J ENGINE

A postaccident examination of the engine remnants, serial number CAE 82303, was conducted at the manufacturer's facility, on January 18, 2012. The compressor exhibited overall thermal damage from fire exposure. The compressor rotor exhibited evidence of trip rub to the first stage compressor blades. Examination of the diffuser revealed no vane damage or anomalies. The accessory gear box had been consumed by fire, leaving the internal gearing. The outer combustion case displayed crush damage from the dome area extending across the top with a puncture on the top, just aft of the air tube flange. Visual examination of the inside of the liner revealed no evidence of unusual burn patterns or streaking. Both the power turbine and gas producer supports were visually normal and only exhibited external thermal exposure. Removal of the harness and examination of probe tips revealed no evidence of over temperatures. Separation of the power turbine rotor, suction side, showed circumferential rub around both the inner and outer rim faces from rotational contact with corresponding areas of the No. 3 wheel. Engine shafting components were normal other than thermal exposure. No examination of the pneumatic system could be conducted due to thermal damage. Rotational signatures within the compressor and turbine modules were observed. No preaccident mechanical malfunction or failures were found that would have precluded normal operation. For more details see Attachment 4.

Jose L. Obregon
Air Safety Investigator

ATTACHMENTS

Attachment 1	FAA Form 8000-36 (Conformity Inspection)
Attachment 2	Weight and Balance
Attachment 3	Maintenance Records
Attachment 4	Rolls-Royce's Engine Teardown Examination Report