Aviation Investigation Final Report

Location:	Green Cove Springs, Florida	**Accident Number:**	ERA12MA122
Date & Time:	December 26, 2011, 05:54 Local	**Registration:**	N5016M
Aircraft:	Bell 206B	**Aircraft Damage:**	Destroyed
Defining Event:	Controlled flight into terr/obj (CFIT)	**Injuries:**	3 Fatal
Flight Conducted Under:	Part 135: Air taxi & commuter - Non-scheduled		

Analysis

The pilot, who was SK Jets' president, owner, and director of operations, received a call from one of his company schedulers about 0335, notifying him about a trip for his largest customer to transport a doctor and a medical technician from Mayo Clinic Heliport, Jacksonville, Florida, to Shands Cair Heliport, Gainesville, Florida, to procure an organ for transplant. To prepare for this flight, the pilot reviewed aviation routine weather reports (METARs) and terminal area forecasts (TAFs) on the Internet; however, he did not obtain a standard weather briefing from a Federal Aviation Administration-approved source. At the time of his review of the METARs and TAFs, weather conditions near the departure heliport were visual meteorological conditions (VMC), with visibility of 10 miles and a broken cloud ceiling at 7,000 feet. Weather conditions were also VMC near Shands Cair Heliport, with visibility of 6 miles and a broken cloud ceiling at 1,600 feet. A TAF included a temporary condition during the estimated time of arrival near Shands Cair Heliport of instrument meteorological conditions (IMC) with visibility of 4 miles in mist and an overcast cloud ceiling at 400 feet.

Just before the accident flight, the helicopter completed a short, uneventful repositioning flight from the operator's home base at a nearby airport to Mayo Clinic Heliport. During that flight, although the helicopter initially climbed to about 1,000 feet above ground level (agl), it then flew between 700 and 900 feet agl, possibly due to a low cloud ceiling.

About 0537, the helicopter picked up the doctor and medical technician at Mayo Clinic Heliport, departed, and proceeded southwest, flying a track slightly south and east of a direct course to Shands Cair Heliport. The pilot likely selected this route of flight so that he could navigate by landmarks and fly low in order to stay out of clouds. The pilot contacted an air

traffic controller 4 minutes before the accident to ask about the status of restricted airspace, which he learned was inactive at the time. The transmissions were routine, and there was no evidence that the pilot or helicopter were experiencing any problems. During the en route portion of the 17 minute accident flight, the helicopter's altitude varied between about 450 and 950 feet agl. The helicopter's airspeed was about 100 to 110 knots. The last three radar returns were consistent with a right turn of about 45 degrees and a 300-foot descent, which placed the helicopter on a near-direct west course to Shands Cair Heliport at an altitude about 450 feet agl. The accident site was located about 1/2 mile south of the last radar return, with a southerly debris path, consistent with a significant change in course and left turn with a continued descent.

The 320-foot-long straight debris field, with descending cuts into trees, was indicative of substantial forward speed at the time of impact. Examination of the wreckage revealed no evidence of any preimpact failures or malfunctions of the engine, drive train, main rotor, tail rotor, or structure of the helicopter. Additionally, there was no indication of an in-flight fire.

The accident helicopter was not certified for instrument flight rules (IFR) flight and did not have an autopilot or radar altimeter. Further, the helicopter's global positioning system did not have an optional modification that would have included a terrain and obstacle warning feature. The operator's general operating manual (GOM) noted that unless otherwise approved by the director of operations or chief pilot, the weather minimums for visual flight rules (VFR) flight in a helicopter at night were a 1,000 foot cloud ceiling and 3-mile visibility. The GOM did not address whether the pilot, as director of operations, could approve himself to deviate from the night VFR minimums in a helicopter. All weather information suggests that there were areas of both VMC and IMC along the route of flight. The recorded weather near Mayo Clinic Heliport about 16 minutes after departure, when the helicopter was nearly halfway between Mayo Clinic Heliport and Shands Cair Heliport, included a broken cloud ceiling at 700 feet. Further, airmen's meteorological information (AIRMET) Sierra was in effect at the time of the accident and indicated the potential for IFR conditions with mist and fog covering the route of flight and accident site. Although the pilot likely did not receive this AIRMET, the pilot did receive the information about the TAF indicating possible IMC. A former company helicopter pilot familiar with the flight route described the accident area as susceptible to fog due to swampy terrain and indicated that once fog develops (which would obscure the ground and surface features), the area was a "black hole" at altitudes of 200 to 400 feet agl, and a flight was effectively in IMC in these circumstances. During postaccident interviews, other company pilots stated that they would have accepted the trip based on weather reports presented but would have arranged a backup plan, such as ground transportation or transportation by fixed-wing aircraft, if the flight could not be completed. There was no evidence the pilot had arranged such a backup plan in the event that the trip could not be completed as scheduled due to the potential for IMC. (Although SK Jets used a flight risk analysis tool [FRAT] to assess risk of both helicopter and fixed-wing flights, a FRAT form was not recovered for the accident flight.

However, had the FRAT form been filled out, it would have shown that the flight was low risk.)

The pilot's financial pressure as the owner of the company likely influenced his decision to continue flight into deteriorating weather conditions. The operator's business had declined several years before the accident as a result of economic recession. The accident helicopter had been leased days before the accident. The operator's only IFR certified helicopter, which was the largest customer's preferred helicopter, had been down for maintenance for 4 months while the operator attempted to secure loans for engine maintenance. The pilot was scheduled to meet with this customer in the coming weeks to obtain clarification about the customer's requirements. The pilot was also aware that his largest customer had begun identifying other aviation companies that might better fulfill its needs. Thus, the pilot would have been highly motivated to complete trips as requested so that he could demonstrate the reliability of his service. Additionally, due to the economic downturn, the pilot's company had lost millions of dollars during the 3 years before the accident. Therefore, the pilot likely wanted to make the most of every revenue generating opportunity.

Review of the pilot's medical history revealed a 30-year history of hypertension and several other conditions, including insomnia, all of which were well controlled with medication. A postmortem analysis indicated that the levels of medication for insomnia that were in the pilot's system at the time of the accident were below the therapeutic range and did not imply impairment. His routine conversation with a controller just minutes before the accident suggests that he was not incapacitated.

Regarding the pilot's work, rest, and sleep history, review of company records revealed that the pilot had not flown in the 7 days before the accident and had spent the previous 2 days with family, celebrating his anniversary and a holiday, indicating that he was not overworked during the days before the accident. The pilot experienced some circadian disruption during the 2 nights preceding the accident. Although he normally awoke about 0630, he awoke about 0800 the day before the accident and about 0330 the morning of the accident, and the accident occurred before his normal waking time. In addition, the pilot had experienced some sleep restriction for 2 nights preceding the accident. He obtained about 5 hours of sleep during each of those nights. However, according to the pilot's wife, the pilot had been a 6 hour a night sleeper for the past 50 years and felt well rested on 6 hours of sleep. In addition, he supplemented his nighttime sleep with a 1- to 1 1/2-hour nap during the afternoon the day before the flight. Therefore, the reduction in his recent sleep, compared with his reported sleep need, was very small. Although the pilot likely experienced some fatigue on the morning of the accident because of circadian disruption and reduced sleep, the pilot's reduction in total sleep was quite low compared to his reported sleep need, and the National Transportation Safety Board was unable to determine the extent to which fatigue might have affected the pilot's

preflight decision-making and performance during the accident flight.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's improper decision to continue visual flight into night instrument meteorological conditions, which resulted in controlled flight into terrain. Contributing to the pilot's improper decision was his self-induced pressure to complete the trip.

Findings

Personnel issues	Decision making/judgment - Pilot
Environmental issues	Personal pressure - Not specified

Factual Information

History of Flight

Enroute-cruise	VFR encounter with IMC
Maneuvering	Controlled flight into terr/obj (CFIT) (Defining event)

HISTORY OF FLIGHT

On December 26, 2011, about 0554 eastern standard time, a Bell 206B helicopter, N5016M, collided with terrain while maneuvering near Green Cove Springs, Florida. The airline transport pilot and two passengers were fatally injured. The helicopter was substantially damaged. The helicopter was registered to Abraham Holdings, LLC, and operated by SK Logistics, doing business as SK Jets, as a 14 Code of Federal Regulations (CFR) Part 135 on-demand air taxi flight. Night instrument meteorological conditions (IMC) prevailed along the flight route, and no flight plan was filed. The flight originated from Mayo Clinic Heliport (6FL1), Jacksonville, Florida, about 0537 and was destined for Shands Cair Heliport (63FL), Gainesville, Florida.

Review of the pilot's portable electronic devices revealed that he received a call from a company scheduler about 0335 notifying him about the accident trip. About 0357, he reviewed weather reports for airports near the flight route on his computer. About 0423, he opened a card-activated entrance gate to the SK Jets hangars at Northeast Florida Regional Airport (SGJ), St. Augustine, Florida.

According to Federal Aviation Administration (FAA) radar data, the helicopter conducted an uneventful repositioning flight from SGJ to 6FL1. It departed SGJ about 0517 and arrived at 6FL1 about 0530. Although the helicopter initially climbed to 1,000 feet above ground level (agl) during the repositioning flight, it then flew between 700 and 900 feet.

After picking up the two passengers, the helicopter departed 6FL1 to the southwest, flying a track slightly south and east of a direct course to 63FL. The pilot contacted Jacksonville Approach about 0549 to inquire about the status of restricted airspace. About 0550, the controller replied that the restricted areas were inactive; the pilot acknowledged the transmission. No further communications were received from the pilot. During the enroute portion of the flight, the helicopter's altitude varied between approximately 450 and 950 feet agl. The helicopter's calibrated airspeed was about 100 to 110 knots. (For more information about the helicopter’s airspeed, see the National Transportation Safety Board’s [NTSB] Radar Study in the public docket for this accident.) The last three radar returns were consistent with a right turn of about 45 degrees and a 300-foot descent, which placed the helicopter on a near-direct course to 63FL about 450 feet agl. The last radar target was recorded at 0553:23, indicating a calibrated airspeed of 81 knots. The accident site was located about 1/2 mile south of the last radar return, with a southerly debris path.

According to representatives of the Mayo Clinic Hospital, Jacksonville, Florida, the accident flight was contracted by the hospital to carry a doctor and a medical technician to Shands Hospital, Gainesville, Florida, for the purpose of procuring an organ for transplant. The flight was then to return to the Mayo Clinic Hospital with the procured organ. The flight did not arrive at Shands Hospital and was reported overdue by a Mayo Clinic Hospital representative; the hospital activated local search and rescue operations. The wreckage was located about 1000 in a remote wooded area by the Jacksonville Sheriff's Department Aviation Unit.

PERSONNEL INFORMATION

The pilot, age 68, was the founder, president, owner, and director of operations of SK Jets. He held an airline transport pilot certificate with ratings for airplane single engine and multiengine land. He also held a commercial pilot certificate and a flight instructor certificate, both with ratings for rotorcraft and instrument helicopter. Additionally, he held type ratings in the Learjet and Learjet 60. His most recent FAA first-class medical certificate was issued on October 5, 2011, with a restriction that he must wear corrective lenses. The pilot learned to fly at age 16 and later flew for the US Army, which included one-and-a-half tours of duty in Vietnam where he earned a Bronze Star, Purple Heart, and Distinguished Flying Cross with Three Oak Leaf Clusters.

Review of company records revealed that the pilot had accumulated 11,343 total flight hours, 3,646 hours of which were in helicopters with 1,648 hours in the Bell 206. He had accrued a total of 3,288 hours of night experience and 3,259 hours of instrument experience. The pilot had flown 10.7 hours and 2.5 hours during the 90-day and 30-day periods preceding the accident, respectively, of which 3.1 hours and 1 hour were at night, respectively. None of the flight time during the 90 days preceding the accident was instrument time. The pilot had not flown during the 7-day period preceding the accident.

The pilot was involved in a previous accident on December 22, 2007 (NTSB case number MIA08CA040). The accident pilot attempted the flight with three passengers onboard; however, a few minutes into the flight, he turned back and returned to the departure airport due to poor weather. (The ceiling was 400 feet, and the visibility was 2.5 miles.) While returning to the fuel pump area, the helicopter's tail rotor struck trees, resulting in substantial damage to the helicopter. There were conflicting reports about whether the collision happened during approach or taxi. According to current and former employees at SK Jets, a different helicopter pilot had turned down the flight due to the poor weather. Following that accident, the pilot successfully completed an FAA reexamination.

Work/Rest/Sleep History

According to the pilot's wife, he normally awoke about 0630 every day and went to sleep around 2330 or 0000, whether it was a workday or not. He had been a 6-hour-a-night sleeper for at least 50 years. On Friday, December 23, 2011, the pilot awoke about 0630 and went to

the office about 0730. He came home early that day because it was his 50th wedding anniversary. He and his wife went to a nearby resort, arriving about 1500. They had a quiet evening at the resort, ate dinner, and stayed the night. The pilot's wife estimated that he might have fallen asleep about 2330.

On Saturday, December 24, 2011, the pilot awoke about 0630, then went back to bed and slept an extra hour. He ate breakfast with his wife at the resort, and they ran an errand. They returned home and then visited the residence of a relative, where they ate lunch. They returned home again about 1620. The pilot engaged in routine activities and took a nap between 1800 and 1900. The pilot and his wife left the house about 2230 and attended midnight services at their church.

On Sunday, December 25, 2011, the pilot and his wife returned home from church about 0115, and the pilot went to sleep about 0300. He awoke about 0800 and celebrated Christmas morning. The pilot went for a bike ride in the early afternoon and stopped by the office. He returned home and ate lunch about 1330. The pilot then told his wife he was going to take a nap (beginning about 1600) in case he had to fly that night because another SK Jets helicopter pilot was not going to be available. The pilot's wife was not sure how long he napped, perhaps 1 hour to 1 1/2 hours. After his nap, he got up and engaged in routine activities around the house. He ate dinner and went to sleep between 2230 and 2300 before being awakened by the telephone call about 0335.

AIRCRAFT INFORMATION

The five-seat, single-engine, two-bladed helicopter was manufactured in 1979 and maintained under an FAA-approved manufacturer's maintenance program. The helicopter's most recent inspection was a conformity inspection, completed on December 1, 2011. At the time of the inspection, the helicopter had accumulated 11,172.5 total hours of operation. The helicopter had flown about 3.5 hours since that inspection until the time of the accident.

The helicopter was equipped with a Rolls Royce (Allison) model 250-C20B, 420-shaft horsepower turbine engine. Review of the maintenance records revealed that the engine was overhauled and installed on the helicopter in 2005 at 11,053.5 total engine hours. The engine had accumulated 167.1 hours since the overhaul until the time of the accident.

The helicopter was not certified for instrument flight rules (IFR) flight and was not equipped with a radar altimeter or autopilot. The helicopter was equipped with a Garmin GNS 430 global positioning system receiver and a very high frequency omnidirectional range unit with localizer and glideslope indications. However, the Garmin GNS 430 unit installed on the helicopter only had modifications 1 through 5, which do not provide a terrain or obstacle warning function. An upgrade (modification 7) was available for the unit, which would have provided terrain/obstacle warning capabilities.

Before the accident flight, the helicopter was fueled with 35 gallons of Jet A aviation fuel,

which brought its total fuel load to approximately 58 gallons.

METEOROLOGICAL INFORMATION

There was no record of the pilot contacting flight service for the accident flight. However, the pilot's laptop computer was located at his residence, and its Internet browser was open to www.aviationweather.gov, with weather data displayed from the Aviation Digital Data Service (ADDS). The data included aviation routine weather reports (METARs) for SGJ; Craig Municipal Airport (CRG), Jacksonville, Florida; and Gainesville Regional Airport (GNV), Gainesville, Florida. The data also included terminal area forecasts (TAFs) for CRG and GNV. The ADDS service was not one of the weather sources approved in the SK Jets operations specifications; however, some company pilots stated during interviews that they used weather sources that were not approved in the general operations manual (GOM) or operations specifications as a supplement to the approved weather. (The GOM indicates to use an FAA-approved weather source.)

Review of the laptop computer data revealed that the METAR for the initial departure airport, SGJ, about 0327 reported 10 miles visibility, scattered clouds at 1,700 feet, and a broken cloud ceiling at 7,000 feet. About 0509, about the time of initial departure, the recorded weather at SGJ included 10 miles visibility, a broken ceiling at 900 feet, and an overcast ceiling at 8,000 feet.

CRG was located about 7 miles northwest of 6FL1. Review of the laptop computer data revealed that the METAR for CRG about 0353 reported 10 miles visibility and a broken ceiling at 7,000 feet. The recorded weather at CRG about 0553 was wind from 010 degrees at 6 knots, visibility 10 miles, overcast ceiling at 700 feet, temperature 14 degrees C, dew point 13 degrees C, and altimeter 30.22 inches Hg.

The METAR for GNV, located about 5 miles northeast of the destination heliport, about 0353 reported 6 miles visibility, mist, and a broken cloud ceiling at 1,600 feet. The TAF at GNV for the accident flight’s estimated time of arrival at 63FL called for wind from 030 degrees at 6 knots, visibility better than 6 miles, and an overcast ceiling at 800 feet. The TAF also included a temporary condition during the estimated arrival time of IMC with visibility 4 miles, mist, and an overcast ceiling at 400 feet. Additionally, data downloaded from the pilot's cell phone revealed that he called the GNV automated surface observing system about 0419. The recorded weather at GNV about 0424 was wind calm, visibility 7 miles, broken ceiling at 1,400 feet, temperature 16 degrees C, dew point 14 degrees C, and altimeter 30.19 inches Hg. The recorded weather at GNV about 0553 was wind 020 degrees at 3 knots, visibility 7 miles, sky clear, temperature 16 degrees C, dew point 14 degrees C, and altimeter 30.21 inches Hg.

The accident site was located about 12 miles northeast of Palatka Municipal Airport (28J), Palatka, Florida. The recorded weather at 28J about 0554 was wind 010 degrees at 3 knots, visibility 10 miles, few clouds at 3,800 feet, broken ceiling at 7,000 feet, temperature 15 degrees C, dew point 14 degrees C, and altimeter 30.21 inches Hg.

The National Weather Service Surface Analysis Chart for 0700 depicted a stationary front to the south of the accident site, stretching from central Florida westward into the northern Gulf of Mexico. A cold front stretched from eastern Florida northeastward into the western Atlantic Ocean. The station models surrounding the accident site depicted temperatures from the low 50s to low 60s F, with temperature-dew point spreads of 3 degrees F or less, a north wind between 5 and 20 knots, and mostly cloudy skies. Station models along and south of the stationary and cold fronts had temperatures from the low to mid 60s F, with temperature-dew point spreads of 1 degree F or less, a north to northeast wind of 5 to 10 knots, cloudy skies, and fog.

Infrared data from the Geostationary Operational Environmental Satellite number 13 was obtained from the National Climatic Data Center and processed with the NTSB's Man computer Interactive Data Access System workstation. Satellite imagery surrounding the time of the accident, from 0200 through 0800 at approximately 15 minute intervals, were reviewed, and the closest images to the time of the accident depicted a layer of low clouds and stratus over the accident site about 0602. This layer of low clouds and stratus moved southward from 0602 through 0632, covering Keystone Airpark, Keystone Heights, Florida, and approaching GNV and 28J.

At the time of the accident, airmen's meteorological information (AIRMET) Sierra was in effect for IFR conditions with mist and fog, which covered the flight route and accident site. AIRMET Sierra was issued about 0345 and valid until 1000.

Review of US Naval Observatory Sun and Moon data for the date and location of the accident revealed that the beginning of civil twilight did not occur until 0654 and moonset occurred about 1849 the previous day.

A former SK Jets helicopter pilot described the area near the accident site as susceptible to fog due to swampy terrain. He added that once fog developed, the area was a "black hole" at altitudes of 200 to 400 feet agl, and a flight in these circumstances was effectively in IMC.

During postaccident interviews, other pilots from SK Jets stated that they would have accepted the trip based on weather reports presented but would have arranged a backup plan, such as ground transportation or fixed-wing transportation, if the flight could not be completed. There was no record of the accident pilot arranging any other transportation relating to the accident flight. Medical personnel reported that the transplant team had a maximum of 4 hours between cross-clamping the heart at the donor hospital and reprofusing it at the recipient hospital, which allowed for a maximum of about 2 1/2 hours for transportation. Additionally, shorter transportation times increased the odds of a successful operation, which made helicopter transportation the preferred method between the two hospitals.

The SK Jets GOM, section V, page V-10, paragraph V.14, "VFR [visual flight rules] Helicopter Minimums," stated, in part, "Unless otherwise approved by the Director of Operations or Chief

Pilot, the following weather minimums will be used for VFR flight in the helicopter…Night – 1000 Foot Ceiling and 3 miles visibility." Further review of the GOM did not reveal any restrictions for the accident pilot, as director of operations, to approve himself to deviate from night VFR helicopter minimums.

When the company manuals did not dictate limitations, operations were governed by 14 CFR Parts 91 and 135. Title 14 CFR 91.155 stated that no person may operate a helicopter under VFR in Class G airspace at an altitude of 1,200 feet or less above the surface at night unless the flight visibility was at least 3 miles. A helicopter may be operated clear of clouds if operated at a speed that allows the pilot adequate opportunity to see any air traffic or obstruction in time to avoid a collision.

Section 135.205 stated that no person may operate a helicopter under VFR in Class G airspace at an altitude of 1,200 feet or less above the surface at night unless the visibility was at least 1 mile.

Section 135.207 stated that no person may operate a helicopter under VFR unless that person has visual surface reference or, at night, visual surface light reference sufficient to safely control the helicopter.

SK Jets used a flight risk analysis tool (FRAT) to assess risk of both helicopter and fixed wing flights. Pilots were required to complete the FRAT forms before flight. An SK Jets helicopter pilot stated that he did not complete the FRAT form before flights because the grading criteria typically yielded such low risk scores that they would never result in a flight being canceled. The maximum possible risk score was 66, and company policy indicated that pilots were required to obtain approval from another manager if the score reached 20 points and refuse the flight automatically if the score reached 45 points; however, the scores rarely approached 20 points. A FRAT form was not recovered for the accident flight.

WRECKAGE AND IMPACT INFORMATION

A debris field originated with several pine trees that were severed by breaks at descending altitudes. The debris field was approximately 320 feet long and 70 feet wide, extending on a magnetic course of 172 degrees. The initial tree strike was at an estimated height of 30 feet above the ground, which severed an approximately 50-foot-tall tree.

Pieces from the helicopter's chin bubble were located near the initial tree strike. A large section of tailboom, a piece of right skid, both rear cabin doors, the main rotor hub with half of the red main rotor blade remaining, and one tailrotor blade were located approximately 110 to 130 feet along the debris path, respectively. The main wreckage and engine were located about 175 feet along the debris path, and approximately 80 percent of the wreckage was consumed in the postcrash fire. The instrument panel, seats, and a section of the white main rotor blade were located beyond the main wreckage.

The collective pitch jack shaft was wrapped around a tree with the engine, transmission, and oil cooler. The cyclic and collective controls were separated from the system along with the antitorque pedals, which were located forward past the first piece of the tailboom and the copilot's tail rotor controls. 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. Due to impact and fire damage, flight control continuity could not be confirmed.

All tail rotor drive shaft segments with Thomas couplings extended rearward from the short shaft to where the 90-degree gear box separated. Some segments were not located and were likely consumed by the postcrash fire. The remaining drive shaft segments exhibited evidence of overload signatures. Both tail rotor blades separated from the 90 degree gear box. The red main rotor 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 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.

Postaccident examination of the engine revealed that the compressor rotor exhibited evidence of tip rub to the first stage compressor blades. The accessory gear box had been consumed by fire, exposing 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-temperature operation. The suction side of the power turbine rotor showed circumferential rubbing around both the inner and outer rim faces, consistent with rotational contact with corresponding areas of the No. 3 wheel. Rotational signatures within the compressor and turbine modules were observed. No preimpact mechanical malfunction or failures were found that would have precluded normal operation.

The main rotor mast (upper end) was submitted to the NTSB materials laboratory for examination. The mast was heavily deformed and bent above the fracture. Magnified examination of the fracture revealed large overstress shear lips around the mast. The orientation of the shear lips and the overall pattern of deformation were consistent with a bending overstress separation.

The annunciator panel was submitted to the NTSB 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 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.

Most of the cockpit instrumentation was destroyed. The altimeter was recovered, and 30.22 was displayed in the Kollsman window. The altimeter needles were destroyed.

MEDICAL AND PATHOLOGICAL INFORMATION

An autopsy was performed on the pilot on December 27, 2011, by the state of Florida, District 4 Medical Examiner's Office, Jacksonville, Florida. The cause of death was listed as "multiple injuries."

Toxicological testing on the pilot was performed by the FAA's Civil Aerospace Medical Institute, Oklahoma City, Oklahoma. Review of the toxicology report revealed that Pravastatin and Zolpidem were detected in the liver and blood.

The pilot's wife stated that the pilot was very physically fit and in excellent health. He wore eyeglasses with trifocal lenses. He did not have a history of chronic medical conditions. He had high blood pressure since he was 30 but was on three medications for it, and it was under control. He had not experienced any illnesses in the days before the accident. There was no history of serious medical conditions resulting in sudden death among his close relatives. He did not snore or exhibit any signs of sleep disorders. He visited a flight surgeon regularly and had been seeing a personal physician for 30 years. She said that he rarely drank alcohol, and when he did, it was perhaps a glass of wine with dinner. His most recent consumption of alcohol was a glass of champagne on Friday evening, December 23, 2011. He did not use tobacco products.

Review of medical records from the pilot's primary care physician (PCP) revealed a history of hypertension, well controlled; hyperlipidemia, well controlled; insomnia, well controlled; bladder cancer (1997); esophageal reflux; gastric ulcer; prediabetes; vitamin D deficiency; right cataract removal (2004); right total knee arthroplasty (2009); and fractured leg (2010). The last entry in his PCP medical records, dated August 2011, revealed no significant findings in all the major body systems. His current medications at that time included aspirin; multivitamins; Nifedipine (Procardia, Adalat); Zolpidem (Ambien); Triamterene (Maxzide); Pravastatin; and Lisinopril.

ADDITIONAL INFORMATION

SK Jets

The company was founded by the accident pilot in 1997. At the time of the accident, the company's fleet consisted of four fixed-wing airplanes and three helicopters, including one Agusta 109, which had been down for maintenance for 4 months. Another Bell 206 helicopter was committed full time to a fire management contract in Florida, and the accident helicopter was leased to SK Jets days before the accident in December 2011.

Per 49 CFR 831.11, SK Jets appointed a party representative to actively participate in the NTSB

investigation. Following the accident, in February 2012, SK Jets filed for bankruptcy protection and was no longer conducting flight operations. During the bankruptcy, employees were released from service, and the company could no longer provide any employees to support the NTSB investigation.

The SK Jets director of safety, chief pilot, director of maintenance, director of charter, former director of charter, and former director of operations all provided positive comments regarding the company's safety culture during NTSB interviews. They had no particular safety concerns about the company and expressed a belief that the company's independent auditing ratings, which are discussed further in this section, signified that the company had developed a positive safety culture. Company pilots interviewed after the accident also conveyed positive comments about the company's safety culture and indicated that they had no particular safety concerns. They said that they were not worried about repercussions for making safety-oriented decisions and that they felt comfortable expressing safety concerns. The director of maintenance, who had been with the company for 4 months, said that the safety culture at SK Jets was "to the standard." He conveyed no particular concerns. The company's most recent FAA principle operations inspector (POI), who had visited the company four times since September 2011, indicated that he had conducted a flight check on one of its flight crews, in addition to interacting with company representatives by phone every 2 weeks. He stated that SK Jets appeared to be a "normal" Part 135 operator. He added that company personnel seemed cognizant of safety risks.

Two former company pilots (one helicopter pilot and one fixed-wing pilot) who witnessed the accident pilot's December 22, 2007, accident expressed concern about the safety culture at SK Jets. (They had worked at SK Jets for about 13 months and 4 months, respectively, and their employment terminated about 3 years before this accident.) They cited management efforts to cover up the accident and threats of retribution that they experienced for reporting the accident to the FAA. The former company helicopter pilot said that the accident pilot confronted him and accused him of "ratting on him." The former company helicopter pilot also stated that company managers told him they would not hold his job open when he deployed with his National Guard unit. As a result, he left the company in January 2008. The former company fixed-wing pilot said that when company managers discovered that he had reported the accident to the FAA, they assigned him more difficult work schedules and pressured him to fly in situations that made him feel unsafe. He further stated that if pilots refused such flights, the company would fire them and make them repay their training expenses. He added that the chief pilot and general manager tried to intimidate younger pilots by threatening to provide negative reports to future employers. He left the company in March 2008 over these and other concerns.

The former company helicopter pilot further stated that company pilots were always on call, and managers urged them to falsify duty time records to indicate that they had received rest periods when they were not flying. The former company fixed-wing pilot also said that pilots were continuously on call and were retroactively considered to be in a rest period when not called for a flight. He also stated that rest periods were regularly interrupted by company calls

and nonflying assignments and that flight crews were routinely exhausted. Both former pilots said that they had complained to the FAA about these practices, and FAA records confirmed that such complaints had been received. A former FAA POI recalled receiving pilot complaints about company scheduling practices, specifically how duty time was being tracked and recorded. He said that in response to these complaints, he told company managers that they could not continuously keep pilots on duty. He said that after this discussion, the company instituted a rotating duty schedule, and he received no more complaints from company pilots about this issue.

The former company fixed-wing pilot also stated that SK Jets pilots had been advised to avoid writing up any maintenance discrepancies in the aircraft logbooks. They had been advised to instead write up issues on adhesive notes and leave them inside the logbooks so that the company could decide when and if it would address the maintenance issues. The former FAA POI stated that there had been a lot of complaints from pilots who were leaving the company about how SK Jets had operated. He added that when he asked managers to make needed changes, they adjusted their practices. The company had corrected any areas of noncompliance that he had identified. He stated that operators with Argus International Inc., (Argus) ratings generally tried harder and were more compliant because they wanted to maintain their Argus rating. (More information about Argus can be found later in this section.)

Current SK Jets managers and pilots said business had been declining in recent years as a result of the economic recession. SK Jets' general manager said the company had renegotiated some loans, the charter business was starting to pick up, and the company's financial condition was improving. While on company premises during the first week of January 2012, NTSB investigators noted that some of the company's Learjets were down for maintenance and sitting idle in a company hangar, with one leaking fuel onto the hangar floor. In addition, the Agusta 109, the company's most capable helicopter and the preferred helicopter for the Mayo Clinic contract, had been down for maintenance since August 2011. The Mayo Clinic's director of supply chain said that he was concerned about the company's finances because of its apparent inability to service aircraft in a timely manner. He said that this had prompted him to begin identifying other aviation companies that could better fulfill the Mayo Clinic's air transportation needs. He reported that the accident pilot was aware of this and had scheduled a January 2012 meeting with him to obtain clarification about the Mayo Clinic's requirements. During the bankruptcy filing, SK Jets indicated that the company lost several million dollars during the three years before the accident and that the company had $1.3 million in assets and $9 million in debt.

During the 10-year period before the accident, SK Jets had experienced three accidents:

--On March 8, 2002, an SK Jets helicopter crashed at night into the Atlantic Ocean (NTSB case number ATL02FA062). The helicopter was destroyed, and the pilot was fatally injured. The flight was being conducted over open water at night, which was contrary to the SK Jets operations specifications.

--On July 24, 2007, an SK Jets Learjet suffered a hard landing in St. Augustine, Florida. The airplane was substantially damaged, and the pilot and copilot were not injured (NTSB case number NYC07LA170).

--On December 22, 2007, as previously mentioned, an SK Jets helicopter struck a tree while returning to the fuel pump area with on-demand passengers onboard in St. Augustine, Florida (NTSB case number MIA08CA040).

Mayo Clinic Jacksonville

SK Jets had entered into an agreement with the Mayo Clinic Jacksonville to provide organ procurement transport services on June 1, 2006. Interviews with personnel from both SK Jets and the Mayo Clinic Jacksonville indicated that the two companies had worked together since 1997; however, the Mayo Clinic Jacksonville only started a formal bidding process for a 3-year contract in 2006. SK Jets was the winning bidder in 2006 and again in 2009 when the contract was renewed.

During the bidding process, prospective vendors were required to submit information to the Mayo Clinic Jacksonville to be used in the evaluation and selection of the service provider. During the process, SK Jets referenced its audits by Argus, which garnered a platinum rating, and subsequent monitoring of the company by Argus as a measure of its level of safety. Mayo Clinic Jacksonville personnel stated that at the time of the bidding process, they had not been familiar with an Argus platinum rating and wanted to know what it meant and how it related to the history of accidents and incidents at SK Jets.

Argus Safety Audits and Rating Process

As part of its due diligence, the Mayo Clinic Jacksonville contacted Argus to ask about the platinum safety rating given to SK Jets and specifically about the history of accidents and incidents at the company. Interviews with the Mayo Clinic Jacksonville personnel indicated that their decision to enter into the agreement with SK Jets was based in part on the fact that Argus had awarded SK Jets a platinum rating while others competing for the contract had only been awarded a gold rating with Argus.

According to its website (www.aviationresearch.com), Argus, which was founded in 1995, was a "specialized aviation services company with global expertise whose mission is to provide the aviation marketplace with the information needed to make informed decisions and manage risk." Interviews with Argus personnel indicated that they never say if a company is safe; rather, they rate the companies based on data collected. As of June 2012, Argus kept data/ratings on approximately 439 operators, of which 104 had a platinum rating, 19 had a gold plus rating, and 316 had a gold rating.

In September 2006, four years after the SK Jets helicopter accident in the Atlantic Ocean (NTSB case number ATL02FA062), SK Jets received its first on-site audit from Argus and was

assigned its highest rating of platinum. (A platinum or gold plus rating required an on-site audit, and a gold rating did not.) When asked about the relationship between the accident and the rating, the director of safety analysis at Argus stated that the accident scored significantly but not as significantly as it would have scored if the accident happened within 36 months of the audit. To maintain the platinum rating, Argus required SK Jets to submit to an on-site audit every 24 months following the initial audit, and scores for the successive audits needed to be appropriate to the rating.

Following the next two SK Jets accidents that occurred in July and December 2007 (NTSB case numbers NYC07LA170 and MIA08CA040, respectively), Argus did not remove the platinum rating. Argus conducted a second audit of SK Jets during October 2008, and Argus temporarily reduced SK Jets' rating from platinum to gold plus. Argus personnel stated that neither accident, individually or combined, played any role in Argus' determination to reduce the rating. Rather, other issues discovered during the audit resulted in the temporary reduction. Subsequently, about 2 months later, the SK Jets' rating was restored to platinum (see below for more information). SK Jets then underwent a third on-site audit in January 2011 and had maintained the platinum rating at the time of the most recent accident.

The former director of operations at SK Jets, who left the company in November 2008, stated that the Argus audits had cost approximately $10,000 each. During the October 2008 audit, deficiencies were found, including those associated with the SK Jets safety management system (SMS). Argus also sold an SMS program. SK Jets corrected deficiencies following the 2008 audit and purchased the Argus SMS program, after which its rating was restored to platinum.

The former company fixed-wing pilot told NTSB investigators that when he was working for SK Jets in 2007 and 2008, two captains did not meet Argus minimum flight time requirements. He believed that the company had submitted false flight time information for these pilots so that the company would appear to conform to Argus requirements. He stated that when he attempted to discuss this issue with the pilots in question, the pilots told him that they were not supposed to discuss their flight experience. He contacted Argus to report the issue and had follow-up conversations with Argus personnel about it. The Argus director stated that Argus had received a whistleblower complaint from a former SK Jets pilot describing a 600-hour discrepancy in the reported flight time of one of the SK Jets pilots. Argus opened an investigation that revealed flight discrepancies with three pilots. SK Jets was tasked with submitting a corrective action report to Argus, which was subsequently received and approved by Argus.

Pilot Information

Certificate:	Airline transport; Commercial	**Age:**	68,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	
Instrument Rating(s):	Airplane; Helicopter	**Second Pilot Present:**	No
Instructor Rating(s):	Helicopter; Instrument helicopter	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 With waivers/limitations	**Last FAA Medical Exam:**	October 5, 2011
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	September 15, 2011
Flight Time:	11343 hours (Total, all aircraft), 1648 hours (Total, this make and model), 11048 hours (Pilot In Command, all aircraft), 11 hours (Last 90 days, all aircraft), 3 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Bell	**Registration:**	N5016M
Model/Series:	206B	**Aircraft Category:**	Helicopter
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	2636
Landing Gear Type:	Skid	**Seats:**	5
Date/Type of Last Inspection:	December 1, 2011 AAIP	**Certified Max Gross Wt.:**	3200 lbs
Time Since Last Inspection:	4 Hrs	**Engines:**	1 Turbo shaft
Airframe Total Time:	11175 Hrs at time of accident	**Engine Manufacturer:**	Rolls-Royce
ELT:	C91 installed, activated, aided in locating accident	**Engine Model/Series:**	M250-C20B
Registered Owner:	ABRAHAM HOLDINGS LLC	**Rated Power:**	420 Horsepower
Operator:	SK Logistics Inc	**Operating Certificate(s) Held:**	On-demand air taxi (135)
Operator Does Business As:	SK Jets	**Operator Designator Code:**	E7LA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Night
Observation Facility, Elevation:	28J,48 ft msl	**Distance from Accident Site:**	12 Nautical Miles
Observation Time:	05:54 Local	**Direction from Accident Site:**	150°
Lowest Cloud Condition:	Few / 3800 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Broken / 7000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	3 knots / None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	10°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.21 inches Hg	**Temperature/Dew Point:**	15°C / 14°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Saint Augustine, FL (6FL1)	**Type of Flight Plan Filed:**	None
Destination:	Gainesville, FL (63FL)	**Type of Clearance:**	None
Departure Time:	05:37 Local	**Type of Airspace:**	

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	2 Fatal	**Aircraft Fire:**	On-ground
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	3 Fatal	**Latitude, Longitude:**	29.881111,-81.755279

Administrative Information

Investigator In Charge (IIC):	Gretz, Robert
Additional Participating Persons:	Bob Hendrickson; FAA AVP-100; Washington, DC David Riser; Rolls-Royce; Indianapolis, IN
Original Publish Date:	June 17, 2013
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=82564