Aviation Investigation Final Report

Location:	New York, New York	**Accident Number:**	IAD05MA078
Date & Time:	June 17, 2005, 16:38 Local	**Registration:**	N317MY
Aircraft:	Sikorsky S-76C	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	1 Serious, 7 Minor
Flight Conducted Under:	Part 91: General aviation - Executive/Corporate		

Analysis

While facing west on a crowded urban heliport on the leeward side of tall buildings that blocked westerly winds of 15 knots gusting to 23 knots, the pilot executed a rearward takeoff in calm winds slightly above the maximum gross weight of the helicopter. Once clear of the heliport and while out-of ground-effect, the pilot executed a right pedal turn for a north departure over the water, and lowered the nose to initiate an acceleration. Simultaneously the helicopter encountered a left quartering tailwind that was originally blocked by the tall buildings. The helicopter began to settle, and contacted the water. While executing the right pedal turn to transition to forward flight, the pilot noticed an audible "degrading" of the rotor rpm, and the N1 in the "yellow." During interviews with the flight crew, neither pilot could articulate what the maximum allowable gross weight was for the environmental conditions. Each pilot could only say the helicopter was "good" for the takeoff. According to performance data, the maximum gross weight for takeoff was 11,700 pounds, but the data didn't provide a means for calculating power margins. Prior to flying into the heliport on the day of the accident, the pilots had the helicopter was fueled to capacity. This decision was based on picking up five passengers instead of the six that actually boarded. Aware of the additional passenger and without conducting any additional performance planning, the pilot attempted the departure. Prior to contacting the water, the crew experienced uncommanded pitch and roll oscillations, and high levels of vibration consistent with settling with power. Examination of the wreckage, post accident engine runs, and testing of the digital engine control units revealed no preimpact anomalies.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: An inadvertent encounter with a left quartering tailwind. Factors in the accident were settling

with power, the high gross weight of the helicopter, and the crew's failure to accurately assess the winds in the area.

Findings

Occurrence #1: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: HOVER - OUT OF GROUND EFFECT

Findings
1. (C) WEATHER CONDITION - TAILWIND
2. (F) SETTLING WITH POWER - INADVERTENT - PILOT IN COMMAND
3. (F) AIRCRAFT WEIGHT AND BALANCE - HIGH - PILOT IN COMMAND
4. (F) WEATHER EVALUATION - INADEQUATE - PILOT IN COMMAND

Occurrence #2: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: DESCENT - UNCONTROLLED

Findings
5. TERRAIN CONDITION - WATER

Factual Information

HISTORY OF FLIGHT

On June 17, 2005, at 1638 eastern daylight time, a Sikorsky S-76C, N317MY, operated by Corporate Aviation Services, LLC was substantially damaged when it impacted water after takeoff from the 34th Street Metroport (6N5), New York, New York. The certificated airline transport pilot was seriously injured. The airline transport-certificated copilot and the six passengers sustained minor injuries. Visual meteorological conditions prevailed, and no flight plan was filed. The corporate/executive flight, destined for New Castle Airport (ILG), Wilmington, Delaware, was conducted under 14 CFR Part 91.

The 34th Street Metroport was located on the west bank of the East River. The purpose of the flight was to fly executives of MBNA Bank from the Metroport to their corporate offices in Delaware.

In an interview, the pilot said that he and the copilot waited at Newark Liberty International Airport (EWR), Newark, New Jersey, with the helicopter in anticipation of the late-afternoon flight from the Metroport to Wilmington. They topped off the helicopter's fuel tanks while they waited.

The helicopter subsequently departed, and the 10-minute flight from Newark to the Metroport, which included a "steep" climb to 1,000 feet, was uneventful. The helicopter landed to the west, facing FDR Drive, and tall buildings of unequal height. After landing, the crew waited for 5 to 10 minutes for the passengers while the engines continued to run.

Because of obstructions to the front, and helicopters parked on either side, the crew decided to "back out" of the parking spot. A hovering takeoff to the rear, with a right pedal turn and a departure to the north over the water was planned. When asked why, the pilot explained that the helicopter was "heavy," and a right pedal turn required less power. He added that the windsock was "dead."

The pilot performed the takeoff, and the helicopter climbed as it backed out of the parking spot. At 25 to 30 feet above the water, about the time of the right pedal turn, the helicopter began to "sink." The pilot noticed an audible "degrading" of the rotor rpm, but did not crosscheck the engine instruments or the rotor tachometer. "It felt like we were losing power and we were starting to sink. I didn't know if we had enough power to fly away, and I couldn't land back due to crowding [on the helipad]."

As the helicopter descended, the pilot maneuvered it toward the western bank. The helicopter shuddered during the descent, as the pilot adjusted the flight controls to cushion for a water

landing. He attempted to deploy the landing gear floats, but was "too late," and the helicopter sank.

Following the water landing, the pilot was unable to locate the cockpit door handle, or to open the door on his side after the helicopter submerged. Unable to open his door, and running short of breath, the pilot released his seatbelt and swam towards light until reaching the surface, adding he had "no idea" on how he exited the cockpit.

The copilot's description of the flight from Newark was consistent with the pilot's. He stated that the crew discussed limiting the fuel purchase at Newark because the helicopter would be close to their computed maximum gross weight, but ultimately decided to fill the tanks.

At the Metroport, the copilot assisted the passengers, loaded their baggage, performed a walk-around inspection, and boarded the helicopter. He performed the before-takeoff check and armed the landing gear floats. The copilot stated that the windsock was not showing its "usual" indication, and that it influenced the decision to depart to the north.

The takeoff and initial climb were "fine," with no rotor rpm decay, or "droop." The helicopter transitioned through the pedal turn and into forward flight. As the helicopter accelerated through effective translational lift (ETL), it descended, and the copilot "heard a little rotor droop." He explained that it was customary for the helicopter to "dip" through ETL, then climb as it accelerated.

Instead, the helicopter continued to descend. According to the copilot, "The N1 gauges were in the yellow, and I can remember hearing the rotor really droop. The helicopter started to yaw, and then about 10 to 15 feet [above the water] it started to shudder violently."

According to the copilot, he then announced "Floats! Floats! Floats!" but waited for the pilot to acknowledge and give the order for the deployment. The pilot did not immediately reply. At water contact, the pilot announced, "Blow the floats!"

After the helicopter submerged, the copilot could not find the door "unlock switch," and never searched for the emergency release handle. Instead, he broke the window out of the copilot's door, cutting his hand. He then released his seatbelt, and swam through the broken window to the surface.

The copilot swam back under the water to search the helicopter for trapped occupants, but he could not gain access to the cockpit or cabin. The copilot resurfaced, and a head count revealed all of the occupants were on top of the water.

The passengers provided written statements, and each stated that they had flown aboard the helicopter several times prior to the accident. One passenger stated as few as six times, and some said over 100 times. Their descriptions of the takeoff and the turn to the north were consistent, and many described a "shake," "shudder," or "wobble" during the descent. One

passenger described the "rotors" as "laboring."

The passengers described their exit through the right cabin door. Many remembered who opened the door and the order in which the passengers exited the helicopter. One passenger said, "I was looking for a door, [passenger name] grabbed me by the collar and pulled me up. I saw light and exited the helicopter. I believe I was the last out..."

The passengers were asked if they were familiar with the emergency evacuation procedures for the helicopter. Responses to the question included "Some," "Somewhat," and "No." Only one of the six passengers said that he was familiar with the procedures.

During a telephone interview, a witness stated that he observed the accident flight while seated in his helicopter at the 34th Street Metroport. He stated that after the helicopter performed the pedal turn, "they dipped the nose down into an accelerating attitude, and went right down into the water."

The witness did not notice decay in rotor rpm, or a yawing of the helicopter. He described the winds at the heliport as light and out of the north/northwest.

The manager of the Metroport was interviewed by telephone, and provided a written statement. Her description of the accident flight was consistent with that of the first witness. She was accustomed to the "dip" when helicopters transitioned to forward flight, but that the accident aircraft "just didn't climb." She observed no smoke or fire from the helicopter prior to its contact with the water.

At 2115, the helicopter was recovered from the East River by the crew of the U.S. Army boat "Hayward," and placed on the 38th Street Pier, New York, New York. The helicopter was defueled, nine pieces of luggage were removed, and the helicopter was placed back on the boat for transport to Port Authority Pier 2, Brooklyn, New York.

The accident occurred during the hours of daylight approximately 40 degrees, 44 minutes north latitude, and 73 degrees, 58 minutes west longitude.

PERSONNEL INFORMATION

The pilot held an airline transport pilot certificate, with a rating for rotorcraft-helicopter. He also held a flight instructor certificate with a rating for rotorcraft-helicopter and instrument helicopter. The pilot's most recent Federal Aviation Administration (FAA) first class medical certificate was issued on November 17, 2004.

The pilot reported 11,470 total hours of flight experience, and 3,200 hours of experience in the Sikorsky S-76, of which, 3,000 hours were as pilot-in-command. His most recent flight review was completed January 28, 2005.

The copilot held an airline transport pilot certificate, with a rating for rotorcraft-helicopter. His most recent FAA first class medical certificate was issued April 18, 2005.

The copilot reported 3,500 total hours of flight experience, 356 hours of which were in the Sikorsky S-76. His most recent flight review was completed January 20, 2005.

AIRCRAFT INFORMATION

The helicopter was a 1986 Sikorsky S-76C Plus, and had accrued 2,452 total flight hours. The helicopter was maintained through a Manufacturer's Inspection Program, and its most recent 100-hour inspection was completed on May 18, 2005, at 2,412 aircraft hours.

A review of maintenance records revealed that scheduled maintenance, inspections, component-replacement and overhaul times were within the manufacturer's limitations. Further, all airworthiness directives thru June 2005 were complied with.

The maximum allowable gross weight for the helicopter was 11,700 pounds. Calculations of crew, passenger, and fuel weights provided by the operator, estimated luggage weight, as well as the weights of books, charts, and refreshment items on board revealed that at the time of the accident, the helicopter weighed 11,746 pounds.

During interviews with the flight crew, neither pilot could articulate the power required for the helicopter to hover in ground effect, out of ground effect, or what the maximum allowable gross weight was for the environmental conditions on the day of the accident. Each pilot could only say that the helicopter was "good" for the takeoff.

Each pilot also stated that when they discussed takeoff performance, and decided to service the helicopter with a full fuel load at Newark, that the decision was based on picking up five passengers. In actuality, six passengers boarded the helicopter at the Metroport, which the crew was aware of at the time of takeoff.

Interpolation of the Hover Out Of Ground Effect chart in the Sikorsky S-76C Plus Flight Manual revealed that the maximum allowable gross weight for the helicopter at the time of the accident was 11,700 pounds. Examination of the chart revealed that only the allowable gross weight for the environmental conditions was derived from the chart. Charts were not provided to determine the power required to hover in ground effect, nor the power required to hover out of ground effect.

Further, there was no chart to determine the maximum power available. Therefore, comparisons between the maximum power available, and the power required to hover, could not be made. Consequently, any power margin available above the power required, could not be determined.

A digital engine control unit (DECU), a single speed N2 governor, controlled each engine in

order to maintain rotor rpm. Emergency, or "Blowaway" power was available in unanticipated circumstances encountered by the pilot. According to the Sikorsky S-76C Plus Flight Manual:

"Blowaway is an escape logic associated with dual engine limiting that removes the takeoff power limiter in certain cases to provide for extraordinary and unforeseen circumstances where increased power beyond the takeoff power limit is required for continued safe operation. Extraordinary turbulence encountered in the final moments of a landing approach to an oil platform or pilot misjudgment of closure rate upon landing to a confined area can serve as operational examples where increased power beyond the limit could be an important contribution.

The blowaway logic can be latched in either of two ways; a slow to moderate rotor decay to 100% Nr, or an excessive decay rate of 5% per second or greater occurring at 104% Nr or less. In both cases rotor droop is occurring because more power is being commanded than the engines can deliver at the takeoff power rating..."

Activation of blowaway power was an automatic feature that was a function of rotor rpm, and required no additional action by the pilot.

METEOROLOGICAL INFORMATION

At 1651, the weather reported at LaGuardia International Airport (LGA), 5 nautical miles east of the Metroport, included a few clouds at 6,000 feet, and a broken ceiling at 10,000 feet. The temperature was 75 degrees Fahrenheit, and the dewpoint was 44 degrees Fahrenheit. The wind was from 270 degrees at 17 knots, gusting to 21 knots.

At 1651, the weather reported at Newark International Airport (EWR), 9 nautical miles west of the Metroport, included a scattered cloud layer at 6,000 feet, and a broken ceiling at 10,000 feet. The temperature was 75 degrees Fahrenheit, and the dewpoint was 46 degrees Fahrenheit. The wind was from 270 degrees at 15 knots, gusting to 23 knots.

WRECKAGE AND IMPACT INFORMATION AND IMPACT INFORMATION

The helicopter was examined at Port Authority Pier 2 on June 18, 2005. There was no evidence of fire. The nose enclosure was broken open, and the weather radar antenna was exposed. The cockpit, cabin area, and empennage were intact. The main transmission and engine cowlings were closed and intact.

The rotor head was attached to the main rotor shaft, and the spindles and cuffs of each blade were intact. The rotor head arms and their associated blades were designated red, blue, yellow, and black. All four blades were fractured within 2 to 6 feet of the rotor cuff. The blue and yellow blades, outboard of the breaks, were recovered.

The 3P and 5P bifilars (vibration absorbers) were still attached. Of the four pitch change rods,

two were fractured, one was bent, and the fourth was attached. All of the four hub arms and their spindles were attached. Each hub displayed dents at the 9 to 12 o'clock quadrant. The dents matched the size and curvature of the spindle.

Droop and flap stops were attached and free to move. The blade dampers remained attached.

The rotating swashplate moved without restriction. The rotating and stationary scissors were attached. All primary servos were attached, and control continuity was established from the cockpit to the servos. Tail rotor control continuity was verified from the pedals to the cable breaks that coincided with where the tailboom was severed.

The tailboom was severed along a diagonal from station 353 on the upper side, to station 420 on the bottom. The exposed sheet metal at the point of separation was displaced in the direction of main rotor rotation.

The remainder of the severed tailboom, with the vertical fin and horizontal stabilizer attached, was largely intact. The intermediate gearbox, number 5 tailrotor driveshaft, and 90-degree gearbox remained attached and intact. The tailrotor hub was intact, and all four tailrotor retention plate bolts were attached and safety-wired. The red and black tailrotor blades were fractured at the cuff. The yellow blade was partially fractured at the cuff and the blue blade was intact.

The main landing gear was down, locked, and intact. The main landing gear floats were not deployed, and stowed. The forward landing gear floats were not deployed, but were no longer stowed due to impact.

The engines were inspected visually. The number 1 engine could be rotated by hand at the compressor. One compressor blade was bent at the tip, opposite the direction of rotation. No other damage was visible. The number 2 engine was rotated by hand at the compressor. There was also no visible damage. Both engines were rinsed with fresh water externally and through the inlet, and then with penetrating oil in the same manner.

On June 19, 2005, the helicopter was moved by truck to a storage facility in Clayton, Delaware. On June 21 and 22, 2005, the engines, Digital Engine Control Units (DECU), and main transmission were removed.

The engines were rotated through the starter drive, and again rinsed through the inlet with penetrating oil prior to being shipped to Turbomeca USA, Grand Prairie, Texas. The transmission was shipped to Sikorsky Aircraft Corporation, Stratford, Connecticut, for examination, and the DECUs were shipped to the Bureau Enquêtes Accidents (BEA), France, for examination under the supervision of the French government.

TESTS AND RESEARCH

On June 28, 2005, the engines were examined at Turbomeca USA, Grand Prairie, Texas. Examination of the number 1 engine revealed that the engine would not immediately rotate. The gas producer section was freed through the starter drive, and the engine was placed in a test cell.

The engine was started with manual control of the fuel flow, and advanced to ground idle. The engine was then shut down and the test cell fuel system was switched to position mode (engine fuel control regulation of fuel flow). The engine was restarted to ground idle, and then advanced to 71 percent gas producer and 96 percent power turbine speed. At this RPM setting the test cell equipment recorded engine vibration at 22 mm/sec., which exceeded the test cell limit of 20mm/sec. The engine accelerated smoothly, and ran continuously without interruption, but the test cell engineer would not continue the test beyond 71 percent gas producer because of engine vibration.

Borescope examination of the engine's interior revealed no damage or mechanical anomalies. The test cell engineer stated that the vibration limits were exceeded due to an out-of-balance condition that resulted from the bent compressor blade.

Examination of the number 2 engine revealed that the engine would not immediately rotate. The gas producer section was freed through the starter drive, and the engine was placed in a test cell.

Initial attempts to start the engine were unsuccessful due to failure codes associated with the fuel control. Removal and disassembly of the fuel control revealed damage and corrosion due to saltwater immersion. The fuel control was bench tested, and the flow rates were within the manufacturer's specifications.

The fuel control from the number 1 engine was removed and installed on the number 2 engine. The engine was started with manual control of the fuel flow, and advanced to ground idle. The engine was then shut down and the test cell fuel system was switched to position mode (engine fuel control regulation of fuel flow). The engine was restarted to ground idle, and then advanced to 98.2 percent gas producer and 107 percent power turbine speed. The engine accelerated smoothly, and ran continuously without interruption.

On July 21, 2005, the DECUs were disassembled at the BEA laboratory, Le Bourget, Cedex, France. The electrically erasable programmable read-only memory (EEPROM) cards were removed, rinsed, and oven-dried, before the data was extracted.

Examination of the data by Turbomeca, France, revealed that the final power-up cycle corresponded with the accident flight. Failure codes were recorded 25 minutes and 15 seconds after the final power-up cycle was initiated. According to the report, the failure messages were "...most likely the consequences of the impact."

The French accredited representative read, and concurred with, the report.

Flight Testing

On September 7, 2006, a demonstration flight was conducted in an S-76C Plus flight simulator in West Palm Beach, Florida. Because of programming and software limitations, an exact re creation of the flight could not be conducted. The simulator had a "plus 12" power margin. As a result, all flight maneuvers were conducted at much lower power settings than an actual aircraft. Even though an exact re creation was not possible, during several of the simulations, the helicopter descended into the water while executing the accident flight profile.

ADDITIONAL INFORMATION

A review of Corporate Aviation, LLC operational and safety procedures revealed that no Crew Resource Management Program existed, and that no common terms were outlined in the Operations Manual. Crew resource management training was conducted during annual recurrent training, and evaluated during check rides.

The operations manual outlined general guidelines for fixed-wing airplane operations, but no separate operations manual, or separate addendum to the operations manual existed for helicopter operations.

There was no "aviation-specific written plan" for Risk Assessment/Risk Management, and company pilots did not participate in the FAA sponsored Wings Program during the three years prior to the accident.

Pilots reviewed emergency equipment and egress procedures during recurrent training, but no on-site collective training was documented prior to the accident. Neither was collective training for employees/passengers documented prior to the accident.

Underwater egress and helicopter emergency device system (HEEDS) training was not performed prior to the accident, but was scheduled for all flight crews following the accident.

The Rotorcraft Flying Handbook, FAA-H-8083-21, Chapter 11, Helicopter Emergencies, Vortex Ring State (Settling With Power), stated:

"Vortex ring state describes an aerodynamic condition where a helicopter may be in a vertical descent with up to maximum power applied, and little or no cyclic authority. The term 'settling with power' comes from the fact that the helicopter keeps settling even though full engine power is applied.

In a normal out-of-ground-effect hover, the helicopter is able to remain stationary by propelling a large mass of air down through the main rotor. Some of the air is recirculated near the tips of the blades, curling up from the bottom of the rotor system and rejoining the air entering the rotor from the top. This phenomenon is common to all airfoils and is known as tip vortices.

Tip vortices consume engine power but produce no useful lift. As long as the tip vortices are small, their only effect is a small loss in rotor efficiency. However, when the helicopter begins to descend vertically, it settles into its own downwash, which greatly enlarges the tip vortices. In this vortex ring state, most of the power developed by the engine is wasted in accelerating the air in a doughnut pattern around the rotor.

In addition, the helicopter may descend at a rate that exceeds the normal downward induced-flow rate of the inner blade sections. As a result, the airflow of the inner blade sections is upward relative to the disc. This produces a secondary vortex ring in addition to the normal tip-vortices. The secondary vortex ring is generated about the point on the blade where the airflow changes from up to down. The result is an unsteady turbulent flow over a large area of the disc. Rotor efficiency is lost even though power is still being supplied from the engine.

A fully developed vortex ring state is characterized by an unstable condition where the helicopter experiences uncommanded pitch and roll oscillations, has little or no cyclic authority, and achieves a descent rate, which, if allowed to develop, may approach 6,000 feet per minute. It is accompanied by increased levels of vibration.

A vortex ring state may be entered during any maneuver that places the main rotor in a condition of high upflow and low forward airspeed. This condition is sometimes seen during quick-stop type maneuvers or during recoveries from autorotations. The following combination of conditions are likely to cause settling in a vortex ring state:

1. A vertical or nearly vertical descent of at least 300 feet per minute. (Actual critical rate depends on the gross weight, r.p.m, density altitude, and other pertinent factors.)
2. The rotor system must be using some of the available engine power (from 20 to 100 percent).
3. The horizontal velocity must be slower than effective translational lift."

The Good Aviation Practices publication Helicopter Performance, published by the Civil Aviation Authority of New Zealand (November 2002), stated:

"Turbulence and Windshear: The possibility of turbulence and windshear should be considered when determining takeoff and landing performance. (Windshear is a change in wind speed and or direction over a very short distance.) The presence of windshear can cause the sudden loss of translational lift and increase the power required to that of OGE hover and beyond - particularly accompanied by a downdraught.

Local terrain, trees, and buildings all influence the flow of wind near them. The mechanical turbulence resulting from this disturbed airflow may become very marked in the lee of the obstruction.

In winds below 15 knots, the turbulence in the lee may extend vertically to about one third higher than the obstruction. In winds above 20 knots, eddies can occur on the leeward side to

a distance of about 10 to 15 times the obstruction height, and up to twice the obstruction height above the ground.

A gust wind situation where windshear is likely to be present during takeoff will require a greater power margin to deal with any unexpected loss of airspeed and sink."

Pilot Information

Certificate:	Airline transport; Flight instructor	**Age:**	56,Male
Airplane Rating(s):	None	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	
Instrument Rating(s):	Helicopter	**Second Pilot Present:**	Yes
Instructor Rating(s):	Helicopter	**Toxicology Performed:**	No
Medical Certification:	Class 1 Without waivers/limitations	**Last FAA Medical Exam:**	November 1, 2004
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	January 1, 2005
Flight Time:	11470 hours (Total, all aircraft), 3200 hours (Total, this make and model), 9123 hours (Pilot In Command, all aircraft), 58 hours (Last 90 days, all aircraft), 18 hours (Last 30 days, all aircraft), 6 hours (Last 24 hours, all aircraft)		

Co-pilot Information

Certificate:	Airline transport	**Age:**	42,Male
Airplane Rating(s):		**Seat Occupied:**	Left
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	
Instrument Rating(s):	Helicopter	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 1 Without waivers/limitations	**Last FAA Medical Exam:**	April 1, 2005
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	January 1, 2005
Flight Time:	3500 hours (Total, all aircraft), 356 hours (Total, this make and model), 1750 hours (Pilot In Command, all aircraft), 60 hours (Last 90 days, all aircraft), 20 hours (Last 30 days, all aircraft), 6 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Sikorsky	**Registration:**	N317MY
Model/Series:	S-76C	**Aircraft Category:**	Helicopter
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	460
Landing Gear Type:	Retractable - Tricycle	**Seats:**	8
Date/Type of Last Inspection:	May 1, 2005 100 hour	**Certified Max Gross Wt.:**	11700 lbs
Time Since Last Inspection:	40 Hrs	**Engines:**	2 Turbo shaft
Airframe Total Time:	2412 Hrs as of last inspection	**Engine Manufacturer:**	Turbomeca
ELT:	Installed, not activated	**Engine Model/Series:**	Ariel 2S1
Registered Owner:	Corporate Aviation, LLC	**Rated Power:**	
Operator:		**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	LGA,22 ft msl	**Distance from Accident Site:**	5 Nautical Miles
Observation Time:	16:51 Local	**Direction from Accident Site:**	90°
Lowest Cloud Condition:	Few / 6000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Broken / 10000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	17 knots / 21 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	270°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.69 inches Hg	**Temperature/Dew Point:**	24°C / 7°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	NEW YORK, NY (6N5)	**Type of Flight Plan Filed:**	None
Destination:	WILMINGTON, DE (ILG)	**Type of Clearance:**	None
Departure Time:	16:38 Local	**Type of Airspace:**	

Airport Information

Airport:	EAST 34TH STREET 6N5	**Runway Surface Type:**	
Airport Elevation:	10 ft msl	**Runway Surface Condition:**	
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Serious, 1 Minor	**Aircraft Damage:**	Substantial
Passenger Injuries:	6 Minor	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Serious, 7 Minor	**Latitude, Longitude:**	40.743331,-73.971664

Administrative Information

Investigator In Charge (IIC):	Rayner, Brian
Additional Participating Persons:	Michael DiPaolo; FAA/FSDO; Farmingdale, NY Archie Whitten; Turbomeca USA; Grand Prairie, TX Chris Lowenstein; Sikorsky Aircraft; Stratford, CT
Original Publish Date:	May 29, 2007
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=61736