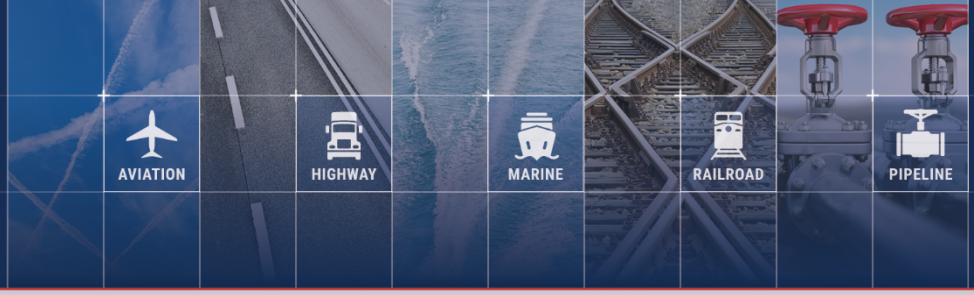

Aviation Investigation Final Report

Location:	Jasper, Georgia	**Accident Number:**	ERA16LA159
Date & Time:	April 15, 2016, 19:55 Local	**Registration:**	N561AM
Aircraft:	EUROCOPTER FRANCE AS350	**Aircraft Damage:**	Substantial
Defining Event:	Settling with power/vortex ring state	**Injuries:**	4 None
Flight Conducted Under:	Part 135: Air taxi & commuter - Non-scheduled - Air Medical (Medical emergency)		

Analysis

The helicopter was approaching the helipad with a direct 11-knot tailwind gusting to 16 knots. About 250 ft above ground level, the commercial pilot lost tail rotor and cyclic authority, and the helicopter pitched forward and accelerated toward the ground. The pilot recognized the onset of vortex ring state, reduced engine power, and attempted to initiate a go-around; however, insufficient altitude remained to complete the maneuver, and the helicopter landed hard, resulting in a partial separation of the tailboom. The operator reported and postaccident examination confirmed that there were no mechanical malfunctions or failures with the helicopter before the accident.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

The pilot's loss of helicopter control due to vortex ring state, which resulted in a hard landing. Contributing to the accident was the pilot's decision to conduct the landing approach with a tailwind.

Findings

Aircraft	Descent rate - Not attained/maintained
Personnel issues	Incorrect action performance - Pilot
Personnel issues	Aircraft control - Pilot
Environmental issues	Tailwind - Decision related to condition

Factual Information

History of Flight

Landing	Settling with power/vortex ring state (Defining event)
Landing	Hard landing

On April 15, 2016, about 1955 eastern daylight time, a Eurocopter France AS350B2, N561AM, operated by Air Methods Corporation, was substantially damaged during collision with terrain near Jasper, Georgia. The commercial pilot and three medical flight crewmembers were not injured. Visual meteorological conditions prevailed. The helicopter was operating on a company visual flight rules flight plan from Lanier Park Hospital Heliport (38GA), Gainesville, Georgia, to a helipad at Piedmont Mountainside Hospital, Jasper, Georgia. The helicopter emergency medical service flight was conducted under the provisions of 14 Code of Federal Regulations Part 135.

According to a witness, the helicopter performed a circuit over the hospital prior to approaching the helipad to land. The helicopter began to descend, then about 110 ft above ground level (agl), the helicopter "bobbled up and down" and then it started to "fall quickly toward the ground."

According to the operator and the pilot, the helicopter completed an orbit over the hospital helipad about 800 ft agl prior to beginning a descent for landing. The pilot initiated a downwind approach to the helipad over high tension power lines, about 250 ft agl, and then turned onto the final leg of the approach, which was on a 300° heading. He said the tail rotor became "difficult to control," and the helicopter pitched forward uncommanded, and then began a "rapid descent with forward airspeed."

Believing he "might be in a vortex ring state condition," the pilot reduced the power and initiated a go-around but lacked sufficient altitude to complete the maneuver. The pilot maintained forward airspeed and raised the nose but landed hard, bounced three times, and came to rest upright. The pilot and three medical crew members then exited the helicopter without injury or assistance.

The weather reported at Pickens County Airport (JZP), Jasper, Georgia, about a half-mile northwest of the accident location included wind from 120°at 11 knots, gusting to 16 knots, with 10 miles visibility. The temperature was 18° C, the dew point was -8° C, and the altimeter setting was 30.24 inches of mercury.

Examination of the helicopter revealed substantial damage due to a partial separation of the taiboom. The operator reported, and examination confirmed, that there were no mechanical malfunctions or failures prior to the accident.

According to representatives from Airbus Helicopters, the maximum allowable engine torque setting was for the helicopter was 100 percent continuous. The Vehicle Engine Multifunction Display (VEMD) was reviewed under federal supervision and the data indicated overtorque events at 107 percent for 2 seconds and 113 percent for 1 second.

According to the FAA Rotorcraft Flying Handbook, "vortex ring state" (or "settling with power") describes an aerodynamic condition where a helicopter may be in a vertical (with regard to the air mass) descent with up to maximum engine power applied, and little or no cyclic authority. The term "settling with power" comes from the fact that a helicopter keeps settling, even though full engine power is applied. However, when the helicopter begins to descend vertically, it settles into its own downwash, which greatly enlarges the main rotor blade 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.

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, including near-vertical descents of at least 300 ft per minute, and a horizontal velocity slower than that for effective translational lift. A fully developed vortex ring state can be "characterized by an unstable condition in which the helicopter experiences uncommanded pitch and roll oscillations."

The handbook also noted that "when recovering from a settling with power condition, the tendency on the part of the pilot is to first try to stop the descent by increasing collective pitch. However, this only results in increasing the stalled area of the rotor, thus increasing the rate of descent. Recovery is accomplished by increasing forward speed, and/or partially lowering collective pitch." With sufficient altitude, temporary entrance into an autorotation will also enable safe exit from the vortex ring state.

Pilot Information

Certificate:	Commercial	**Age:**	52,Male
Airplane Rating(s):	None	**Seat Occupied:**	Front
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	4-point
Instrument Rating(s):	Helicopter	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	June 16, 2015
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	October 7, 2015
Flight Time:	4214 hours (Total, all aircraft), 1620 hours (Total, this make and model), 4214 hours (Pilot In Command, all aircraft), 30 hours (Last 90 days, all aircraft), 10 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	EUROCOPTER FRANCE	**Registration:**	N561AM
Model/Series:	AS350 B2	**Aircraft Category:**	Helicopter
Year of Manufacture:	2007	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	4381
Landing Gear Type:	Skid	**Seats:**	4
Date/Type of Last Inspection:	April 7, 2016 Continuous airworthiness	**Certified Max Gross Wt.:**	4630 lbs
Time Since Last Inspection:	57 Hrs	**Engines:**	1 Turbo shaft
Airframe Total Time:	3386 Hrs as of last inspection	**Engine Manufacturer:**	Turbomeca
ELT:	C126 installed, not activated	**Engine Model/Series:**	Arriel 1D1
Registered Owner:	TD AVIATION FINANCE LLC	**Rated Power:**	681 Horsepower
Operator:	AirMethods Corporation	**Operating Certificate(s) Held:**	On-demand air taxi (135)
Operator Does Business As:		**Operator Designator Code:**	QMLA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Dusk
Observation Facility, Elevation:	JZP,1535 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	19:55 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	11 knots / 16 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	120°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.23 inches Hg	**Temperature/Dew Point:**	18°C / -8°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	GAINESVILLE, GA (38GA)	**Type of Flight Plan Filed:**	Company VFR
Destination:	Jasper, GA (NONE)	**Type of Clearance:**	None
Departure Time:	19:38 Local	**Type of Airspace:**	

Airport Information

Airport:	Hospital Helipad NONE	**Runway Surface Type:**	
Airport Elevation:	1535 ft msl	**Runway Surface Condition:**	
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	4 None	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	4 None	**Latitude, Longitude:**	34.445556,-84.445831(est)

Administrative Information

Investigator In Charge (IIC):	Kemner, Heidi
Additional Participating Persons:	Danny Cox; FAA/FSDO; Atlanta, GA Jason Quisling; Air Methods Corporation; Englewood, CO
Original Publish Date:	July 16, 2018
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=93018