Aviation Investigation Final Report

Location:	Galliano, Louisiana	**Accident Number:**	CEN19FA095
Date & Time:	March 10, 2019, 12:03 Local	**Registration:**	N577AL
Aircraft:	Bell 407	**Aircraft Damage:**	Destroyed
Defining Event:	Loss of control in flight	**Injuries:**	2 Fatal
Flight Conducted Under:	Part 135: Air taxi & commuter - Non-scheduled		

Analysis

The pilot of the helicopter departed on the flight to transport the passenger to an offshore platform; several minutes before the accident, he transmitted a pilot report describing a cloud ceiling about 700 ft above ground level and 6 statute miles visibility. Onboard data indicated that the helicopter entered a descending left turn from about 300 ft above ground level that continued until the helicopter impacted a marsh.

The turn to the north was not consistent with the intended route of flight. The characteristics of the turn as it tightened over the last 25 seconds of the flight (increasing roll, decreasing pitch, and vertical descent rate) are consistent with the pilot experiencing spatial disorientation and loss of control. The restricted visual references resulting from the low cloud ceilings and flight over a body of water that lacked significant contrasting terrain features would have been conducive to the development of spatial disorientation; and the low altitude in which he was flying would have limited his available time to recover.

Postaccident examination revealed no mechanical anomalies that would have precluded normal operation.

Probable Cause and Findings

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

The pilot's loss of control during cruise flight as a result of spatial disorientation while operating the helicopter in close proximity to terrain in marginal meteorological conditions.

Findings

Personnel issues	Aircraft control - Pilot
Personnel issues	Spatial disorientation - Pilot
Aircraft	Altitude - Not attained/maintained
Environmental issues	Low ceiling - Effect on operation
Environmental issues	Water - Effect on operation

Factual Information

History of Flight

Enroute-descent	Course deviation
Enroute-cruise	Loss of control in flight (Defining event)

On March 10, 2019, about 1203 central daylight time, a Bell 407 helicopter, N577AL, was destroyed when it was involved in an accident near Galliano, Louisiana. The pilot and passenger received fatal injuries. The helicopter was operated as a Title 14 *Code of Federal Regulation Part 135* on-demand passenger flight.

The flight originated from Bristow US LLC Heliport (2LS0), Galliano, Louisiana, about 1155, and was destined for an offshore platform in Viosca Knoll (VK956), Gulf of Mexico, about 69 nautical miles east/southeast of Venice, Louisiana. The pilot was scheduled to drop off the passenger at VK956 and then perform three additional flights.

Automatic dependent surveillance-broadcast (ADS-B) track data showed that the helicopter departed toward the southwest, then made a climbing left turn to an easterly heading and continued to climb for several miles, reaching a height of about 600 ft mean sea level about 1200. Around this time, the pilot of another helicopter heard the accident pilot issue a pilot report stating that ceilings were at 700 ft above ground level and visibility was 6 statute miles. The helicopter then began descending to an altitude of about 450 ft msl about 1201, crossing 50-ft-tall power lines oriented north-south. The helicopter continued eastbound while descending to about 300 ft and beginning a gradual left turn. The helicopter continued to descend to about 200 ft and turned through north along the east edge of a body of water about 1202:45. It made a slight climb to about 300 ft, and then went into a steep descent to the end of the data track. The elevation in the area was approximately 4 ft msl.

Data from an onboard Appareo GAU 2000 unit showed that after turning on course after takeoff, the helicopter had maintained a heading of about 090°. About 1202, a gradual left turn began with roll angles not exceeding 15° through the first 25 seconds of the turn. Over the next 25 seconds, the turn tightened, and the roll angle increased from about 15° to about 40-43°, while during this time the helicopter's heading changes from about 070° to 320°. Nose down pitch angle increased beyond 10° to about 14° in the last 5 seconds of the flight and the maximum rate of descent was about 2,446 feet per minute about 4 seconds before the data ended at 1202:51.

About 1305, a company search and rescue pilot was notified of an overdue/missing aircraft. The rescue pilot stated that the weather was visual flight rules (VFR) conditions, with broken clouds above 1,000 ft and at least 10 miles visibility. The wreckage was located about 1329.

There were no witnesses to the accident.

Pilot Information

Certificate:	Commercial	**Age:**	61,Male
Airplane Rating(s):	None	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	3-point
Instrument Rating(s):	Helicopter	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	September 4, 2018
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	February 16, 2019
Flight Time:	21420 hours (Total, all aircraft), 7298 hours (Total, this make and model), 21165 hours (Pilot In Command, all aircraft), 138 hours (Last 90 days, all aircraft), 9 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

According to the pilot's employment application with Air Logistics (subsequently merged with Bristow US LLC), the pilot served as a pilot in the United States Marine Corps (among other roles). He was hired in January 1990 by Air Logistics as a helicopter pilot and served as pilot-command (PIC) on Bell 47, Bell 206, Bell 209, Bell 212, Bell 407, Boelkow BO-105, EC-120, and EC-135 helicopters.

On February 16, 2019, the pilot received a 14 CFR Part 135.293(a) and Part 135.293(b) airman proficiency/qualification, day PIC VFR recurrency check conducted by a company check airman in a Bell 407. The checkride was 0.8 hour long, and the result of the check was satisfactory.

The pilot did not hold authorization to act as PIC under instrument flight rules.

Aircraft and Owner/Operator Information

Aircraft Make:	Bell	**Registration:**	N577AL
Model/Series:	407	**Aircraft Category:**	Helicopter
Year of Manufacture:	1998	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	53247
Landing Gear Type:	Skid	**Seats:**	4
Date/Type of Last Inspection:	March 10, 2019 AAIP	**Certified Max Gross Wt.:**	
Time Since Last Inspection:		**Engines:**	1 Turbo shaft
Airframe Total Time:	20264 Hrs as of last inspection	**Engine Manufacturer:**	Rolls-Royce Allison
ELT:	Installed, not activated	**Engine Model/Series:**	250-C47B
Registered Owner:	BRISTOW US LLC	**Rated Power:**	675 Horsepower
Operator:	BRISTOW US LLC	**Operating Certificate(s) Held:**	On-demand air taxi (135)
Operator Does Business As:		**Operator Designator Code:**	ALGA

A company pilot stated that he flew an operational check flight in the accident helicopter on March 9, 2019, sometime after the sun went down around 1900, and the flight was "non-eventful." He said that the helicopter was "smooth," and there were no issues with the avionics.

A review of the maintenance logbook revealed no open discrepancies at the time of the accident flight.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	GAO,0 ft msl	**Distance from Accident Site:**	5 Nautical Miles
Observation Time:	11:55 Local	**Direction from Accident Site:**	270°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	Overcast / 600 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	4 knots /	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:	170°	**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	30.12 inches Hg	**Temperature/Dew Point:**	25°C / 23°C
Precipitation and Obscuration:			
Departure Point:	Galliano, LA (2LS0)	**Type of Flight Plan Filed:**	Company VFR
Destination:	Gulf of Mexico, LA	**Type of Clearance:**	None
Departure Time:	11:55 Local	**Type of Airspace:**	Class G

The Houston, Texas, Center Weather Service Unit issued several center weather advisories (CWA) during the period between 0904 through 1300 warning of low instrument flight rules (IFR) conditions over the region. The GOES-16 visible satellite image with the CWA advisory for low IFR conditions were plotted with reference to the accident site, depicted in Figure 1.

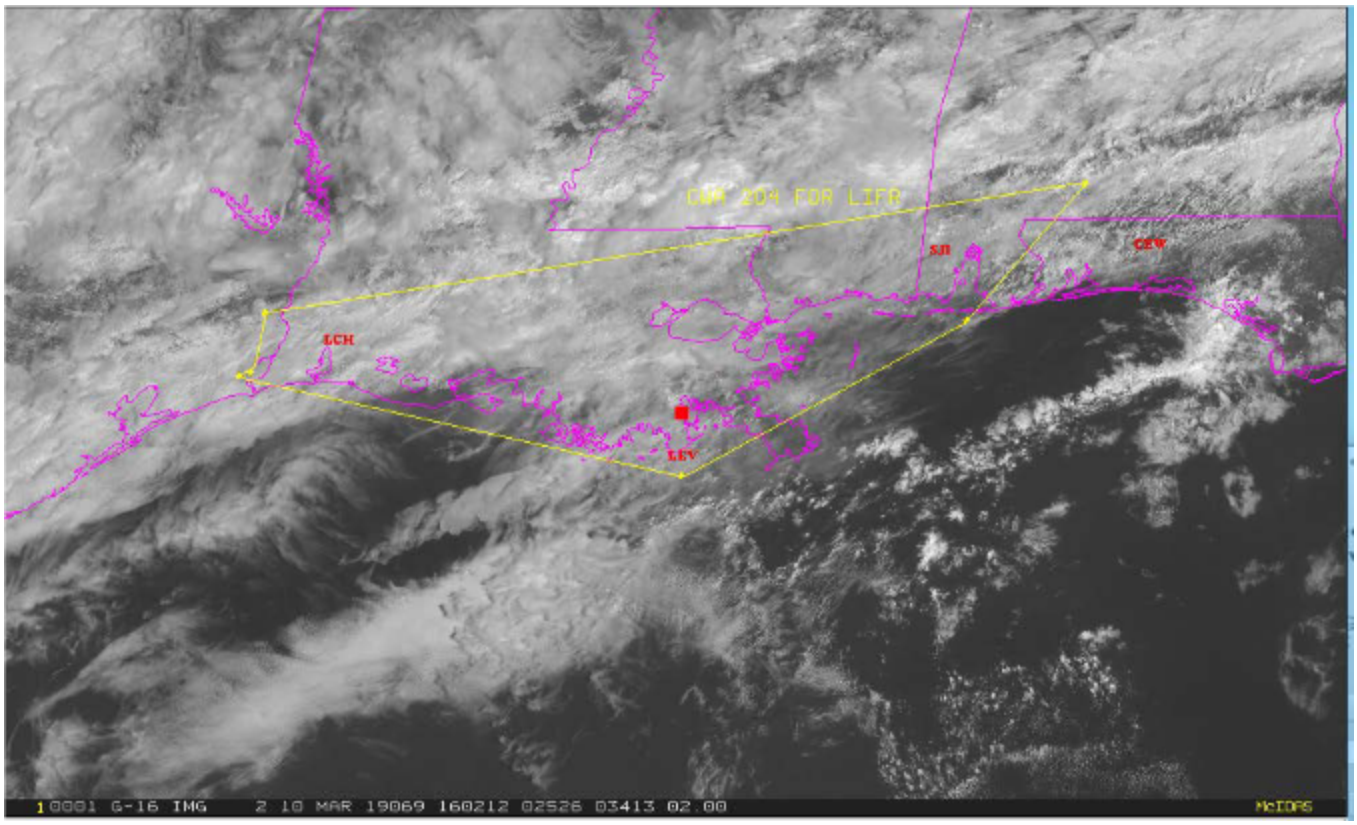

Figure 1: GOES-16 visible satellite image at about 1100 with CWA 204 for LIFR conditions.

The National Weather Service (NWS) issued AIRMET Sierra for IFR conditions with ceilings below 1,000 ft and/or visibility less than 3 miles in mist/fog. The conditions were expected to continue beyond 1600 through 2200.

South Lafourche Leonard Miller Jr. Airport (GAO), Galliano, Louisiana, located about 5 miles west of the accident site, was equipped with an Automated Weather Observation System.

At 1215, conditions, were reported as wind 180° at 5 knots, 10 miles visibility, ceiling overcast 800 ft agl, temperature 25°C, dew point 23°C, altimeter setting of 30.12 inches Hg.

2LS was located 7 miles west of the accident site. About the time of departure, reported conditions included wind 170° at 6 knots, 10 miles visibility or more, ceiling broken at 700 ft agl, broken clouds at 2,200 ft, temperature 24°C, dew point temperature 22°C, altimeter 30.14 inches of Hg.

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:	1 Fatal	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	29.422777,-90.178337(est)

The wreckage was located in a brackish marsh. Terrain features in day visual meteorological conditions are depicted in Figure 2.

Figure 2: Wreckage Site Viewed Toward Northeast

The fuselage was fragmented, and the transmission, main rotor hub and engine remained partially attached to the fuselage structure. Both skids were separated from the fuselage through separations consistent with overload. The wreckage exhibited signatures of a left-turning, nose-low impact attitude.

The instrument panel was separated from the fuselage and several of the engine instruments were separated from the panel. The panel and missing engine instruments were found underwater near the main wreckage. The attitude indicator was disassembled and found to be free moving. There were no signs of anomalies or mechanical damage were found on either the attitude indicator housing or the gyro.

Examination of the flight control system confirmed flight control continuity from the cockpit controls to the main and tail rotor systems.

CT scanning and bench testing of the hydraulic system actuators and hydraulic system pump revealed no mechanical anomalies that would have precluded normal operation.

The main rotor was rotated by hand, during which there was a corresponding rotation of the transmission drive shaft. The transmission chip detectors did not contain debris. The transmission oil filter was opened and no debris was noted.

The light bulb of the right navigation light (green-colored) revealed filament stretching.

The engine compressor exhibited evidence consistent with water ingestion and engine operation at operating speed. Rotation of the compressor by hand resulted in a corresponding rotation of the gas generator turbine and starter/generator. Engine continuity from the compressor through the N1 drive train was confirmed.

Medical and Pathological Information

An autopsy of the pilot was performed at the Jefferson Parish Forensic Center, Harvey, Louisiana. The report stated that the pilot died of multiple blunt force injuries.

Toxicology testing was performed at the FAA Forensic Sciences Laboratory. Results were negative for carboxyhemoglobin and ethanol. Carvedilol and amlodipine were detected in blood and liver. Carvedilol is a prescription medication used to treat heart failure and high blood pressure. Amlodipine is a prescription medication used alone or in combination with other medications to treat high blood

pressure. The pilot reported both medications to the FAA.

Administrative Information

Investigator In Charge (IIC):	Gallo, Mitchell
Additional Participating Persons:	Cory Morara; Federal Aviation Administration; Baton Rouge FSDO; Baton Rouge, LA James Stottlemeyer; Bristow Group Inc.; Houston, TX Jack Johnson; Rolls-Royce Corporation; Indianapolis, IN Beverley Harvey; Transportation Safety Board of Canada; Gatineau,Québec Donald Robson; Bristow Group Inc.; Houston, TX Mark Stuntzner; Bell Textron; Ft Worth, TX Jeremy Katt; Parker Hannifin Corporation; Irvine, CA Ed Reininger; Woodward; Santa Clarita, CA
Original Publish Date:	November 19, 2020
Last Revision Date:	
Investigation Class:	Class 2
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=99080