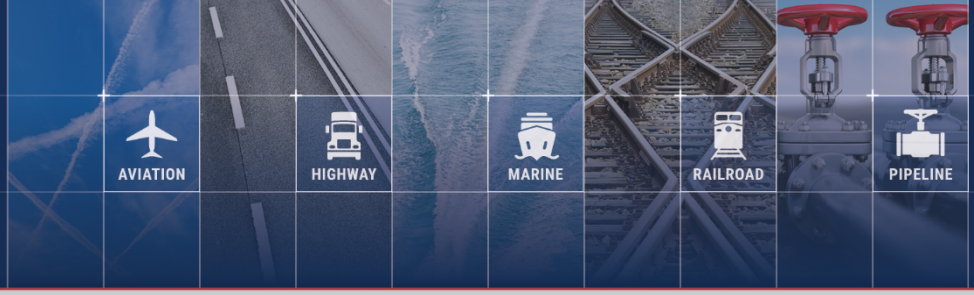

Aviation Investigation Final Report

Location:	BROWNSBORO, Texas	**Accident Number:**	FTW00LA048
Date & Time:	December 18, 1999, 13:30 Local	**Registration:**	N575PF
Aircraft:	Hughes 269A	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	1 Serious, 1 Minor
Flight Conducted Under:	Part 91: General aviation - Other work use		

Analysis

Prior to the accident, the helicopter was flying on an easterly heading in level flight at approximately 20 knots while making shallow turns following a creek bed. The pilot reported that the helicopter lost all of its lift and power and started descending toward the trees. The pilot added that the anti-torque pedals were ineffective and the helicopter was spinning to the right prior to impact with the trees. Minor repairs were made to the engine in order to run the engine on the helicopter. The engine was started and operated twice within the 1300 to 2500 RPM range for 18 minutes. A representative of the engine manufacturer reported 'no pre-existing engine deficiencies were noted and the investigation did not produce any evidence that the engine was not capable of operating and producing power at the time of the accident.' The conditions at the time of the accident were found to be conducive to the formation of a tail rotor vortex ring state.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The loss of tail rotor effectiveness as a result of tail rotor vortex ring state.

Findings

Occurrence #1: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: MANEUVERING

Findings

1. (C) VORTEX RING STATE - ENCOUNTERED - PILOT IN COMMAND
2. (C) TAIL ROTOR EFFECTIVENESS - NOT POSSIBLE - PILOT IN COMMAND

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

Findings
3. TERRAIN CONDITION - HIGH VEGETATION

Factual Information

On December 18, 1999, at 1330 central standard time, a Hughes 269A helicopter, N575PF, was substantially damaged during a hard landing following a loss of engine power while maneuvering near Brownsboro, Texas. The instrument rated commercial pilot sustained minor injuries and his passenger was seriously injured. The helicopter was owned and operated by Brown Helicopter Services, Inc., of Flint, Texas. Visual meteorological conditions prevailed for the Title 14 Code of Federal Regulations Part 91 aerial survey flight for which a flight plan was not filed. The flight originated from the operator's private heliport near Flint, Texas, approximately 1250.

In a written statement submitted by the pilot, he stated that just prior to the accident, the helicopter was flying about 100 feet above the ground on an easterly heading at an estimated airspeed of 20 knots, while making shallow turns following a dry-creek bed. The pilot reported that "suddenly the helicopter lost all of its lift and power and started descending toward the trees below." The pilot further stated that "he applied forward cyclic in an attempt to fly out of it" to no avail. He added that the "anti-torque pedals felt totally ineffective and just prior to impact with the trees the helicopter was in a flat spin to the right." Subsequently, the helicopter fell through the thick canopy of trees and rolled 30 to 45 degrees to the left prior to coming to rest on a northerly heading in the heavily wooded area.

The FAA inspector, who traveled to the accident site, reported that the left side of the airframe sustained structural damage, the tailboom was severed approximately 4 feet aft of the main transmission, and the main and tail rotor blades were structurally damaged.

The helicopter was released and recovered to the maintenance facilities of Reynolds Aviation at the Wills Point Municipal Airport, near Wills Point, Texas, for further examination and testing. On February 3, 2000, the Lycoming HIO-360-B1A engine, serial number L-1720-51A, was examined under the supervision of an FAA inspector. Minor repairs and adjustments were made in order to run the engine while still mounted on the helicopter. A temporary fuel supply line was made to provide fuel from an external source. The engine was started and operated twice at within the 1300 to 2500 RPM range for a cumulative total of 18 minutes.

A representative of the engine manufacturer, who witnessed the engine run, reported "no pre-existing engine deficiencies were noted and the investigation did not produce any evidence that the engine was not capable of operating and producing power at the time of the accident."

The loss of tail rotor effectiveness reported by the pilot and the resulting unanticipated right yaw (spin) also reported by the pilot are signatures consistent with an aerodynamic rotorcraft phenomena known as "tail rotor vortex ring state," for which certain relative wind velocities and azimuth (direction of the relative wind) must be present. These characteristics are present

only at airspeeds below 30 knots, and with relative wind directions of 210 to 330 degrees.

The pilot reported that, at the time of the occurrence, the winds were from 340 degrees at 10 knots. Given the easterly heading of the helicopter, the relative wind direction was approximately 250 degrees.

Pilot Information

Certificate:	Commercial	**Age:**	58,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 Valid Medical--w/ waivers/lim	**Last FAA Medical Exam:**	January 1, 1999
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	918 hours (Total, all aircraft), 367 hours (Total, this make and model), 918 hours (Pilot In Command, all aircraft), 7 hours (Last 90 days, all aircraft), 3 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Hughes	**Registration:**	N575PF
Model/Series:	269A 269A	**Aircraft Category:**	Helicopter
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	121-0033
Landing Gear Type:	Skid	**Seats:**	2
Date/Type of Last Inspection:	November 15, 1999 Annual	**Certified Max Gross Wt.:**	2200 lbs
Time Since Last Inspection:	2 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	5809 Hrs	**Engine Manufacturer:**	Lycoming
ELT:	Not installed	**Engine Model/Series:**	HIO-360-B1A
Registered Owner:	BROWN HELICOPTER SERVICES	**Rated Power:**	180 Horsepower
Operator:		**Operating Certificate(s) Held:**	None
Operator Does Business As:		**Operator Designator Code:**	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	TYR ,544 ft msl	**Distance from Accident Site:**	13 Nautical Miles
Observation Time:	13:53 Local	**Direction from Accident Site:**	70°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	7 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	320°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	14°C / 6°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	FLINT , TX (NONE)	**Type of Flight Plan Filed:**	None
Destination:		**Type of Clearance:**	None
Departure Time:	12:50 Local	**Type of Airspace:**	Class G

Airport Information

Airport:		**Runway Surface Type:**	
Airport Elevation:		**Runway Surface Condition:**	
Runway Used:	0	**IFR Approach:**	
Runway Length/Width:		**VFR Approach/Landing:**	

Wreckage and Impact Information

Crew Injuries:	1 Minor	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Serious	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Serious, 1 Minor	**Latitude, Longitude:**	32.289924,-95.609039(est)

Administrative Information

Investigator In Charge (IIC):	Casanova, Hector
Additional Participating Persons:	HARRY L STEINFELDT; DALLAS , TX
Original Publish Date:	December 4, 2000
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=48358