



AVIATION



HIGHWAY



MARINE



RAILROAD



PIPELINE

# Aviation Investigation Final Report

<b>Location:</b>	Rio Grande, Puerto Rico	<b>Accident Number:</b>	ERA18LA183
<b>Date &amp; Time:</b>	June 30, 2018, 12:55 Local	<b>Registration:</b>	N10CV
<b>Aircraft:</b>	Bell 206	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	Loss of engine power (total)	<b>Injuries:</b>	1 Fatal, 3 Minor
<b>Flight Conducted Under:</b>	Part 91: General aviation - Personal		

## Analysis

The private pilot and three passengers were on a personal local flight. A passenger stated that the first few minutes of the flight were normal, but he then felt what he described as "a pull from the ground," and the helicopter started to descend. He reported hearing a "beep beep" sound, which is consistent with an engine out warning. The passenger reported that the pilot subsequently attempted to land on a road, but the passenger felt the helicopter "just fall down and crash."

During the postaccident examination of the helicopter, 9.5 ounces of engine oil were drained from the oil supply tank, and 6 ounces of engine oil, which contained some metallic debris were drained from the accessory gearbox; however, no significant anomalies were noted following testing of the drained oil.

Engine bearings Nos. 2.5, 6, and 8 did not contain any oil. Noted damage to all of the main bearings was consistent with thermal distress. Slight oil streaking was noted on both sides of the aft fuselage; the source of the oil could not be determined and most likely occurred postaccident.

Material loss of the No. 2 bearing due to a loss of oil resulted in a loss of axial support of the compressor impeller by the No. 2 bearing, allowing forward axial movement of the compressor impeller from its normal position. The compressor impeller eventually contacted the compressor shroud, resulting in a sudden decrease in N1 rpm and a loss of engine power.

The passengers account of the pilot's behavior did not suggest that the pilot was confused or had difficulty in responding to the inflight emergency; therefore, it is unlikely that any of the pilot's known medical conditions or use of medications contributed to the accident.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:  
A total loss of engine power due to oil exhaustion, which resulted in an uncontrolled descent and hard

landing.

## Findings

<b>Aircraft</b>	Oil - Fluid level
<b>Personnel issues</b>	Aircraft control - Pilot

## Factual Information

### History of Flight

<b>Enroute</b>	Loss of engine power (total) (Defining event)
<b>Autorotation</b>	Hard landing

On June 30, 2018, about 1255 Atlantic standard time, a Bell 206B, N10CV, was substantially damaged when it was involved in an accident in Rio Grande, Puerto Rico. The private pilot was fatally injured, and three passengers sustained minor injuries. The helicopter was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The helicopter departed from Fernando Luis Ribas Dominicci Airport (TJIG), San Juan, Puerto Rico, about 1236 and was destined for Villa Marina Heliport (PR26), Fajardo, Puerto Rico. The passenger in the right rear seat stated that the first few minutes of the flight were normal, then he felt what he described as "a pull from the ground," and the helicopter started to descend. The passenger in the left front seat reported that, a few seconds before ground impact, he observed a 0 reading on the torque meter and more than two lights illuminate on the instrument panel. The pilot then said, "we lost the engine, we need to land" and started looking for a landing spot. The passenger in the rear right seat reported hearing a "beep beep" sound, which is consistent with an engine out warning. He stated that the pilot attempted to land on a road, but the passenger felt the helicopter "just fall down and crash."

### Pilot Information

<b>Certificate:</b>	Private	<b>Age:</b>	53, Male
<b>Airplane Rating(s):</b>	None	<b>Seat Occupied:</b>	Right
<b>Other Aircraft Rating(s):</b>	Helicopter	<b>Restraint Used:</b>	Lap only
<b>Instrument Rating(s):</b>	None	<b>Second Pilot Present:</b>	No
<b>Instructor Rating(s):</b>	None	<b>Toxicology Performed:</b>	Yes
<b>Medical Certification:</b>	Class 3 With waivers/limitations	<b>Last FAA Medical Exam:</b>	October 16, 2017
<b>Occupational Pilot:</b>	No	<b>Last Flight Review or Equivalent:</b>	
<b>Flight Time:</b>	2686 hours (Total, all aircraft)		

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Bell	<b>Registration:</b>	N10CV
<b>Model/Series:</b>	206 B	<b>Aircraft Category:</b>	Helicopter
<b>Year of Manufacture:</b>	1979	<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	2851
<b>Landing Gear Type:</b>	Skid	<b>Seats:</b>	5
<b>Date/Type of Last Inspection:</b>	June 28, 2018 100 hour	<b>Certified Max Gross Wt.:</b>	
<b>Time Since Last Inspection:</b>		<b>Engines:</b>	1 Turbo shaft
<b>Airframe Total Time:</b>	3122.4 Hrs at time of accident	<b>Engine Manufacturer:</b>	Allison
<b>ELT:</b>	Installed, not activated	<b>Engine Model/Series:</b>	250-C20
<b>Registered Owner:</b>	On file	<b>Rated Power:</b>	420 Horsepower
<b>Operator:</b>	On file	<b>Operating Certificate(s) Held:</b>	None

The engine was equipped with nine main bearings (Nos. 1, 2, 2.5, 3, 4, 5, 6, 7, and 8), six stages of axial compressor, a single centrifugal compressor (impeller) and four stages of turbine disks. The gear-driven engine-driven oil pump, and scavenge pump are responsible for lubrication and scavenging of oil to and from the main bearings. A metal oil filter provides for capturing contaminants as well as upper and lower chip detectors in the accessory gearbox. The oil is retained in the oil tank, plumbed to the engine via flexible hoses, and returns from the engine to the oil cooler before it is returned to the engine.

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Visual (VMC)	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	TJSJ, 8 ft msl	<b>Distance from Accident Site:</b>	14 Nautical Miles
<b>Observation Time:</b>	11:56 Local	<b>Direction from Accident Site:</b>	278°
<b>Lowest Cloud Condition:</b>	Few / 3400 ft AGL	<b>Visibility</b>	9 miles
<b>Lowest Ceiling:</b>	None	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	17 knots /	<b>Turbulence Type Forecast/Actual:</b>	/
<b>Wind Direction:</b>	60°	<b>Turbulence Severity Forecast/Actual:</b>	/
<b>Altimeter Setting:</b>	30.03 inches Hg	<b>Temperature/Dew Point:</b>	31°C / 23°C
<b>Precipitation and Obscuration:</b>	No Obscuration; No Precipitation		
<b>Departure Point:</b>	San Juan, PR (TJIG)	<b>Type of Flight Plan Filed:</b>	None
<b>Destination:</b>	Fajardo, PR (PR26)	<b>Type of Clearance:</b>	None
<b>Departure Time:</b>	12:23 Local	<b>Type of Airspace:</b>	Class G

## Wreckage and Impact Information

<b>Crew Injuries:</b>	1 Fatal	<b>Aircraft Damage:</b>	Substantial
<b>Passenger Injuries:</b>	3 Minor	<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>	N/A	<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	1 Fatal, 3 Minor	<b>Latitude, Longitude:</b>	18.401945,-65.773612

A Federal Aviation Administration (FAA) inspector examined the helicopter where it came to rest, upright and canted to the right, about 19 miles from TJIG and about 9 miles northwest of PR26. It sustained substantial damage to the fuselage and main rotor system. All major components were accounted for at the scene. The inspector noted a slight amount of oil streaking on the left and right sides of the aft fuselage during the initial examination. The oil tank was undamaged, and no oil was present.

According to the mechanic, the oil pressure torque tube assembly, located in the cabin overhead area, was replaced 2 days before the accident, which included adding less than 1 quart of oil; the helicopter was approved for return to service. During postaccident examination, there was no evidence of oil leakage from the replaced line.

Examination of the oil supply system revealed the engine oil tank remained secured to the airframe by the forward and aft tank supports and was not damaged. The oil filler cap was in place and was capable of being properly secured to the tank; no cracks were noted. The oil level in the tank did not register on the dipstick portion of the cap. About 9.5 ounces of oil were drained from the oil supply tank, lines connected to the tank and oil cooler, as well as from the oil filter. The oil filter was not in bypass, and

the oil filter element contained a small amount of contaminants. No oil leaks were noted at the oil cooler.

All flexible oil supply hoses were intact and remained tightly secured to the oil tank, oil cooler, oil filter, and aft firewall fittings. No excessive oil leakage or stains were noted in the area of these components. The hoses were disconnected from the tank, which was removed from the helicopter. Although examination of the hoses from the engine to the aft firewall fittings found they contained minimal residual oil, no oil was noted between the hose exterior and fire sleeve interior. Testing of the hoses revealed they were in good condition with no leaks noted during pressure testing.

Examination of the engine revealed it remained securely attached to the airframe within the engine bay with the engine mounts remaining intact. No visible external impact damage was noted to the engine. Application of aircraft battery power confirmed an illuminated engine chip light on the master caution panel. Engine oil drained from the accessory gearbox measured less than 6 ounces and contained a slight amount of metallic debris; however, no significant anomalies were noted following testing of the drained oil.

All engine bearings were visually and tactilely examined. The No. 1 bearing was oil coated and rotationally free and smooth. The No. 2 bearing exhibited heavy cage damage with all balls being retained; however, all balls exhibited a deformed or out of round appearance. The No. 2.5 bearing was dry with all balls in place. The No. 3 bearing was oil coated with light drag upon rotation. The No. 4 bearing was oil coated, rotationally free and smooth. The No. 5 bearing displayed heavy drag upon rotation with noted spalling to all balls. The No. 6 bearing was dry, with light drag and displayed light scoring noted to the rollers. The No. 7 bearing was oil coated but was not rotationally free due to metal material seizing the rollers. The No. 8 bearing was visibly dry and rotationally free with light drag.

The damage noted to all the main bearings (except for Nos. 3 and 4) was consistent with thermal distress, with amber discoloration displayed on every surface. Examination of the oil delivery tubes did not reveal any blockages to the oil ports. Disassembly of the compressor revealed heavy circumferential rub damage to the compressor shroud with corresponding damage noted to the compressor impeller.

Further examination of the helicopter confirmed flight control continuity for the collective, anti-torque, and the cyclic. No preimpact anomalies were noted with the fuel and hydraulic systems or the main and tail rotor drive systems.

## **Medical and Pathological Information**

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An autopsy of the pilot was performed by the Gobierno de Puerto Rico in San Juan, Puerto Rico. The cause of death was blunt force injuries.

Toxicology testing performed at the FAA Forensic Sciences Laboratory on fluid and tissue specimens from the pilot returned negative results for carbon monoxide, ethanol, and drugs of abuse. Testing identified the presence of prescribed medications used to treat the pilot's known medical conditions; none of which are considered impairing. Testing also identified 0.092 ug/ml of diphenhydramine (a

sedating antihistamine available over the counter in multiple cold, allergy, sleep-aid products) in the pilot's blood.

Diphenhydramine can impair cognitive and psychomotor performance and cause drowsiness. It typically carries a warning that it may impair performance of tasks like driving and operating heavy machinery. However, diphenhydramine undergoes significant postmortem redistribution; its postmortem central blood levels may increase by about three times.

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Hill, Millicent
<b>Additional Participating Persons:</b>	Jose Zayas-Fernandez; FAA/FSDO; San Juan, PR Dave Riser; Rolls Royce; Indianapolis, IN Gary Howe; Bell Helicopter; Fort Worth, TX
<b>Original Publish Date:</b>	May 19, 2020
<b>Last Revision Date:</b>	
<b>Investigation Class:</b>	<a href="#">Class</a>
<b>Note:</b>	The NTSB did not travel to the scene of this accident.
<b>Investigation Docket:</b>	<a href="https://data.nts.gov/Docket?ProjectID=97672">https://data.nts.gov/Docket?ProjectID=97672</a>

The National Transportation Safety Board (NTSB) is an independent federal agency charged by Congress with investigating every civil aviation accident in the United States and significant events in other modes of transportation—railroad, transit, highway, marine, pipeline, and commercial space. We determine the probable causes of the accidents and events we investigate, and issue safety recommendations aimed at preventing future occurrences. In addition, we conduct transportation safety research studies and offer information and other assistance to family members and survivors for each accident or event we investigate. We also serve as the appellate authority for enforcement actions involving aviation and mariner certificates issued by the Federal Aviation Administration (FAA) and US Coast Guard, and we adjudicate appeals of civil penalty actions taken by the FAA.

The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, “accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties ... and are not conducted for the purpose of determining the rights or liabilities of any person” (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB’s statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available [here](#).