



National Transportation Safety Board Aviation Accident Final Report

Location:	Hauula, Hawaii	Accident Number:	WPR19LA111
Date & Time:	April 16, 2019, 11:26 Local	Registration:	N593C
Aircraft:	MD Helicopter 369	Aircraft Damage:	Substantial
Defining Event:	Fuel exhaustion	Injuries:	4 None
Flight Conducted Under:	Part 135: Air taxi & commuter - Non-scheduled		

Analysis

During the fifth flight of the day, while flying about 1,700 ft mean sea level, the pilot noted the engine-out [warning] beeping, the engine-out light, as well as the re-ignition warning light on the caution warning panel. He noted the FUEL LEVEL LOW caution light did not illuminate during the flight. The pilot entered an autorotation and was able to descend to what looked like a more level area. He made a mayday call, flew toward the lowest and most uniform area of trees, and executed a “full down” autorotation. As the helicopter descended through the tree canopy, the helicopter rolled to the right before coming to rest upside down. All four occupants were able to evacuate the helicopter without assistance.

The pilot reported he had 64 gallons of fuel onboard before beginning his flights for the day. He conducted four flights before the accident flight that involved transporting passengers and cargo to different landing zones. He noted he had about 200 lbs of fuel according to the fuel gauge before he lifted off for the fifth flight. He flew three passengers to three different landing zones to deploy equipment before starting toward a staging area to refuel. He stated the fuel gauge indicated 100 lbs of fuel remaining when he lifted off from the final landing zone to fly about 5 minutes to the staging area. The pilot stated that the engine failure was due to fuel exhaustion because he overestimated his shutdown time, underestimated his flight time, and relied solely on the fuel gauge.

Examination of the fuel low warning system found that a wire to a resistor on the sending unit was corroded and separated, resulting in the FUEL LOW LEVEL light being inoperable. Had the pilot been provided information that a low fuel level condition existed, he would have had about 5 minutes to select an emergency landing site, if airborne, or had the opportunity to decide not to depart on the next flight segment.

Probable Cause and Findings

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

Fuel exhaustion as a result of the pilot's fuel burn miscalculation. Contributing to the accident was the inoperative caution light indicating low fuel level.

Findings

Aircraft	Fuel - Fluid level
Personnel issues	Fuel planning - Pilot

Factual Information

On April 16, 2019, about 1126 Hawaii time, a McDonnell Douglas 369E helicopter, N593C, was substantially damaged when it was involved in an accident near Hauula, Hawaii. The pilot and three passengers were not injured. The helicopter was operated as a Title 14 *Code of Federal Regulations* Part 135 flight.

During the fifth flight of the day, while flying about 1,700 ft mean sea level over mountainous terrain, the pilot noted the engine-out [warning] beeping, the engine-out light, as well as the re-ignition warning light on the caution warning panel. He noted the FUEL LEVEL LOW caution light did not illuminate during the flight. The pilot entered an autorotation and was able to descend to what looked like a more level area. He made a mayday call, flew toward the lowest and most uniform area of trees, and executed a “full down” autorotation. As the helicopter descended through the tree canopy, the helicopter rolled to the right before coming to rest upside down. All four occupants were able to evacuate the helicopter without assistance.

The pilot reported that after having arrived for the first flight of the day at the “Turtle Bay” staging area, he performed his preflight inspection, fueled the helicopter with 64 gallons of fuel, and configured the helicopter for five flights.

The pilot conducted the first four flights between 0750 and 1045, which involved transporting passengers and cargo to different landing zones. He did not shut down the engine between the fourth and fifth flights, and he noted he had about 200 lbs of fuel according to the fuel gauge before he lifted off about 1050. He then flew three passengers to three different landing zones to deploy equipment before starting toward the staging area to refuel. He stated the fuel gauge indicated 100 lbs of fuel remaining when he lifted off from the final landing to fly about 5 minutes to the staging area.

Based on the flight times and shutdown times provided by the pilot, the total flight time was calculated to be about 2 hours and 36 minutes. The total shutdown time was 30 minutes.

The pilot told investigators “...it seems apparent to me that fuel exhaustion was the cause of the engine flaming out and this accident.” He further explained that he planned for enough fuel to complete the missions that morning prior to initial departure but didn’t keep a running track of actual flight time. He also said he knew better than to rely solely on the fuel gauge but had somehow done that.

A Federal Aviation Administration (FAA) inspector examined the wreckage and examined the FUEL LEVEL LOW warning system. He noted the FUEL LOW LEVEL light illuminated when the PRESS TO TEST button was depressed, but it did not illuminate when the [fuel level sending unit] float arm was lowered to simulate a low fuel level. The fuel gauge responded

appropriately when the float arm was raised and lowered. Examination of the circuit board that controls the FUEL LEVEL LOW light revealed a disconnected/broken and corroded wire on one end of the resistor on the board.

According to the helicopter manufacturer, the FUEL LEVEL LOW light illuminates based on the configuration of the helicopter. This normally occurs with about 35 pounds of fuel remaining, of which about 22.5 pounds is usable. This would equate to about 3.3 gallons of usable fuel remaining. Considering a fuel burn of about 35 gallons per hour, the engine would operate about 5 minutes until the engine flamed out after illumination of the FUEL LEVEL LOW light.

History of Flight

Enroute-cruise	Fuel exhaustion (Defining event)
Enroute	Loss of engine power (partial)
Emergency descent	Off-field or emergency landing
Autorotation	Collision with terr/obj (non-CFIT)

Pilot Information

Certificate:	Commercial	Age:	42, Male
Airplane Rating(s):	Single-engine land	Seat Occupied:	Left
Other Aircraft Rating(s):	Helicopter	Restraint Used:	4-point
Instrument Rating(s):	Helicopter	Second Pilot Present:	No
Instructor Rating(s):	Helicopter	Toxicology Performed:	No
Medical Certification:	Class 2 With waivers/limitations	Last FAA Medical Exam:	November 2, 2018
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	February 6, 2019
Flight Time:	2545 hours (Total, all aircraft), 1350 hours (Total, this make and model), 2427 hours (Pilot In Command, all aircraft), 315 hours (Last 90 days, all aircraft), 82 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	MD Helicopter	Registration:	N593C
Model/Series:	369 E	Aircraft Category:	Helicopter
Year of Manufacture:	1986	Amateur Built:	
Airworthiness Certificate:	Normal; Utility	Serial Number:	201E
Landing Gear Type:	Skid	Seats:	5
Date/Type of Last Inspection:	April 12, 2019 100 hour	Certified Max Gross Wt.:	3000 lbs
Time Since Last Inspection:	31.5 Hrs	Engines:	1 Turbo shaft
Airframe Total Time:	3757.5 Hrs at time of accident	Engine Manufacturer:	Rolls-Royce
ELT:	C126 installed, not activated	Engine Model/Series:	250-C20B
Registered Owner:		Rated Power:	420
Operator:		Operating Certificate(s) Held:	Rotorcraft external load (133), On-demand air taxi (135), Commercial air tour (136), Agricultural aircraft (137)
Operator Does Business As:		Operator Designator Code:	K2DA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
Observation Facility, Elevation:	HHI, 837 ft msl	Distance from Accident Site:	9 Nautical Miles
Observation Time:	10:59 Local	Direction from Accident Site:	40°
Lowest Cloud Condition:	Few / 3800 ft AGL	Visibility	10 miles
Lowest Ceiling:	None	Visibility (RVR):	
Wind Speed/Gusts:	10 knots /	Turbulence Type Forecast/Actual:	None / None
Wind Direction:	160°	Turbulence Severity Forecast/Actual:	N/A / Severe
Altimeter Setting:	30.08 inches Hg	Temperature/Dew Point:	26.1°C / 15.6°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Wiamano, HI (NA)	Type of Flight Plan Filed:	None
Destination:	Kahuku, HI (HI58)	Type of Clearance:	None
Departure Time:	10:50 Local	Type of Airspace:	Class G

Wreckage and Impact Information

Crew Injuries:	1 None	Aircraft Damage:	Substantial
Passenger Injuries:	3 None	Aircraft Fire:	None
Ground Injuries:		Aircraft Explosion:	None
Total Injuries:	4 None	Latitude, Longitude:	21.588333,-157.91194

Administrative Information

Investigator In Charge (IIC):	Little, Thomas		
Additional Participating Persons:	Joseph Monfort; Federal Aviation Administration; Honolulu, HI Joan Gregoire; MD Helicopter; Mesa, AZ Juan Sanchez; Federal Aviation Administration; Honolulu, HI		
Original Publish Date:	April 6, 2022	Investigation Class:	3
Note:	The NTSB did not travel to the scene of this accident.		
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=99271		

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).