Aviation Investigation Final Report

Location:	Ozark, Alabama	**Accident Number:**	ERA20LA197
Date & Time:	May 30, 2020, 11:32 Local	**Registration:**	N9421P
Aircraft:	Schweizer 269C-1	**Aircraft Damage:**	Destroyed
Defining Event:	Fuel exhaustion	**Injuries:**	1 Fatal
Flight Conducted Under:	Part 91: General aviation - Instructional		

Analysis

The pilot, who held a pilot certificate with ratings for airplanes, was training for a helicopter rating through the flight school. After conducting a dual instructional flight with his instructor, the pilot serviced the helicopter with fuel and departed on a solo flight, during which he planned to perform several takeoffs and landings at a nearby airport. Security cameras at the nearby airport captured the helicopter performing takeoffs and landings on the runway. A witness next saw the helicopter over a tree line about 1 mile from the runway. The witness described that the helicopter was "sputtering" and that it turned back in the direction it had come from. The engine sounds then ceased, and the helicopter dove and impacted the ground.

Postaccident examinations of the accident site, helicopter, and engine did not reveal evidence of any preimpact mechanical failure or malfunction of the structure, engine, drivetrain, or flight controls that would have precluded normal operation. There also was no evidence of any fire or explosion. Although no anomalies were found with the engine or drivetrain, no power signatures were present on the drivetrain or leading edges of the rotor blades, suggesting that the engine may not have been operating at the time of impact. The fuel tank and carburetor were impact damaged and displayed no evidence of residual fuel. There was no odor of fuel, and no observed fuel blight (browning of vegetation) in the vicinity of the wreckage.

Further examination of the wreckage showed corrosion on the fuel quantity sensor fasteners, and on the adjustment screws used to calibrate the unit. The aluminum probe shaft, which should have been in the fuel tank, was missing, along with the side wires. The ends of the side wires, which were broken and corroded where they came out of the assembly, indicated that the probe and side wires may not have been present before the accident. The fuel tank filler cap was found hanging by its chain. It would attach to the fuel tank but was heavily rusted and there was little or no positive friction to ensure that the cap would remain in place.

During a postaccident interview, the pilot's instructor stated that he checked the helicopter's fuel level when he performed a preflight inspection before the 1.4 hour-long lesson that preceded the pilot's solo flight. The instructor noted that there appeared to be about 20 gallons of fuel in the 33-gallon fuel tank when he checked it. After the dual flight lesson, when the pilot refueled the helicopter, the instructor observed the pilot place the nozzle in the fuel tank filler of the helicopter fuel tank and was carrying on a conversation with the student from the driver's seat of the fuel truck. The student pilot then told the instructor; "Good to go" and gave a "thumbs up." The instructor did not see the student pilot secure the fuel tank filler cap on the fuel tank filler. It is possible that the conversation between the student and the flight instructor may have distracted the student during the fueling procedure.

The amount of fuel onboard the helicopter when the pilot departed on the accident flight could not be determined based on available evidence, nor could it be determined if the pilot failed to properly secure the fuel tank cap or if it opened inflight due to its condition; however, given the lack of fuel at the accident site, no evidence of fuel spillage, and the absence of mechanical anomalies, the circumstances of the accident are consistent with a total loss of engine power due to fuel exhaustion.

The flight instructor stated that the accident helicopter's fuel gauge worked, but it was not 100% accurate and that the low fuel caution lights did not work on the accident helicopter or on the flight school's other operable helicopter. He stated that a few months before the accident, the flight school placarded the low fuel lights on both helicopters they operated as inoperative. Additionally, the flight school's fuel truck was not equipped with a meter to record the quantity of fuel dispensed. Instead, users would estimate the amount of fuel that was in the helicopters by using the fuel gauges and checking the tank visually.

According to the helicopter's Rotorcraft Flight Manual, if the amber FUEL LOW caution light came on in flight, about 1 gallon of usable fuel remained in the fuel tank. The manual instructed that, "If fuel low caution light comes on during flight, land immediately." Although the fuel low caution system was found placarded as inoperative, review of the helicopter's maintenance log revealed no entries documenting the malfunction and deferral. The Federal Aviation Administration (FAA) Master Minimum Equipment List (MMEL) for the helicopter indicated that the fuel low caution light system should have been repaired within 10 days after the malfunction was recorded in the aircraft maintenance logs. Further review of the MMEL also indicated that the low fuel caution light, "May be inoperative provided procedures for monitoring fuel quantity are established and used."

During an interview with an FAA inspector, the owner of the flight school initially stated that several weeks before the accident, during an inspection of the helicopter, the fuel low caution system was found to be inoperative. The mechanic then placarded the helicopter. The owner also explained that "everyone" knew the system was inoperative and as a policy, the helicopters were always rented with a full tank of fuel. In a subsequent letter to the FAA, the owner of the flight school advised that only one of the flight school's helicopters had an inoperative low fuel caution system. He further advised that the placard that was placed on the accident helicopter was placed there by mistake, and that it was supposed to be placed only on the other helicopter. He stated that, at the time of the accident, the low fuel caution system in the

accident helicopter was functioning properly, as was the fuel quantity indicating system, and that the fuel quantity gauge in the helicopters were very accurate and reliable.

The owner of the flight school also stated that the MMEL allowed for having a fuel low caution system inoperative if there was a procedure for monitoring fuel quantity. The procedure they employed in the event that the low fuel caution system was not working was to always fully refuel the helicopters between flights and limit flights to a length of 1.5 hours. He also advised that the flight school used the fuel quantity gauge in the helicopter, in addition to the refuel policy and the flight length limit, to do this. Review of the written operational documents provided by the operator showed that none of these policies were documented.

Given the conflicting statements provided by the flight school owner and the flight instructor regarding the operational status of the fuel quantity indicating system, it was unclear whether the fuel low caution system was operable at the time of the accident. Given the condition of the fuel quantity indicating system components documented during the postaccident examination of the wreckage, and the statement by the flight instructor that the fuel quantity indicating system was not "100% accurate," it was unlikely that the system was able to provide the pilot with an accurate accounting of the helicopter's fuel state. The condition of the fuel quantity indicating system, the fuel tank cap, and the uncertainty surrounding the documentation of the operational state of the low fuel caution system suggested that the operator lacked an adequate system to ensure the airworthiness of the helicopters that it was providing to its customers. Had these systems been fully operational at the time of the accident, it is possible that the student pilot might have recognized and/or avoided the helicopter's critical fuel state before the fuel was completely exhausted and the engine lost total power.

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 fuel exhaustion. Contributing to the accident was the flight school's inadequate maintenance of the helicopter's fuel quantity and caution systems.

Findings

Aircraft	Fuel - Fluid level
Aircraft	Fuel indication system - Incorrect service/maintenance
Personnel issues	(general) - Maintenance personnel

Factual Information

History of Flight

Initial climb	Fuel exhaustion (Defining event)
Emergency descent	Collision with terr/obj (non-CFIT)

HISTORY OF FLIGHT

On May 30, 2020, about 1132 central daylight time, a Schweizer 269C-1 helicopter, N9421P was destroyed when it was involved in an accident near Ozark, Alabama. The student pilot was fatally injured. The helicopter was operated as a Title 14 *Code of Federal Regulations (CFR)* Part 91 instructional flight.

About 0900, on the day of the accident, the student pilot met his flight instructor at Eagle Aviation Academy, which was located at a private heliport in Midland, Alabama. According to the student pilot's flight instructor, prior to the lesson, the flight instructor pushed the helicopter out of the hangar and performed a preflight inspection. Afterwards, the flight instructor and the student pilot did a final weather check and then the instructor waited on the student pilot while the student pilot also conducted a preflight.

When the student pilot was done with his preflight, they took off about 0906. They started off with confined area exercises including two steep approaches and two maximum performance takeoffs. Afterward, they came back to a grass field near the flight school and the flight instructor demonstrated one straight in autorotation, followed by the student pilot performing two straight in autorotations. Then they transitioned to another nearby field, and they did two, 180° autorotations. They landed back at the flight school about 1035 after about 1.4 hours of flight time. The flight instructor performed a post flight walk around and they "topped it off with fuel."

The flight instructor then went into his office and waited for the student pilot to finish his preflight. Once he finished his preflight, they talked about his solo flight which would be a 1.1-hour long flight, staying in the local area and doing a couple normal approaches and takeoffs at Ozark-Blackwell Field Airport (71J), Ozark, Alabama that they used regularly for training. They also looked at the weather and then the student pilot took off about 1110.

Motion activated security cameras at 71J, next captured the helicopter performing takeoffs and landings on runway 31 about 1115, and then around 1131. The helicopter was next observed by a witness over a tree line in a residential area about 1 mile off the departure end of runway 31. According to the witness, the helicopter was "sputtering", then it was observed to turn back in

the direction it had come from, the engine sounds ceased, and the helicopter dove rapidly and impacted the ground.

PERSONNEL INFORMATION

The student pilot held a commercial pilot certificate with ratings for airplane single-engine land, airplane multi-engine land, and instrument airplane. His most recent Federal Aviation Administration (FAA) second-class medical certificate was issued on February 15, 2019, at which time he reported 340 total hours of flight experience. The flight instructor stated that the student pilot had accrued about 66.9 total hours of flight time through the flight school, that he had provided 26.3 hours of dual instruction to the student pilot. The flight instructor also advised that the student pilot had accrued 8.9 hours of solo flight time in helicopters, and estimated that the student pilot would need 7 more hours of dual flight training before taking his checkride.

AIRCRAFT INFORMATION

A review of FAA and helicopter maintenance records revealed that the helicopter was manufactured in 2000. A logbook entry dated July 10, 2018, indicated that the helicopter was purchased in non-flyable storage condition and was reassembled using various new, reconditioned, and overhauled components. The helicopter's most recent 50-hour inspection was completed on April 4, 2020 (about 56 days before the accident). At the time of the inspection, the helicopter had accrued 5,387.4 total hours of operation, and the engine had accrued 1,720 hours of operation since major overhaul.

Postaccident examination of the helicopter revealed that a tail rotor gearbox (P/N z369-A-5400 “E”, S/N 87083) manufactured for Hughes Tool Company by Western Gear Corporation (which predated the date of manufacture of the helicopter) was installed. According to the FAA Type Certificate Data Sheet, this component was prohibited for use on the helicopter, was not listed in the manufacturer’s illustrated parts catalog for the helicopter, and was not listed in Schweizer’s Mandatory Service Notice (N-229.1), which addressed part number conversions from McDonnell Douglas (Hughes) 369 series parts to Schweizer 269 series parts.

According to the Schweizer 269C-1 Rotorcraft Flight Manual, if the amber FUEL LOW caution light came on in flight, approximately one gallon of usable fuel remained in the fuel tank. It instructed that, “If fuel low caution light comes on during flight, land immediately.”

WRECKAGE AND IMPACT INFORMATION

Examination of the accident site revealed no evidence of any fire or explosion. The helicopter impacted a 60- to 70-foot-tall tree before coming to rest. Tree limbs up to about 8 inches in diameter were broken and were found lying within and on the wreckage. A significant amount of oil was leaking from the engine. The main rotor blades remained attached to the hub and displayed upward bending and chordwise wrinkling. The leading edges of the blades were predominantly undisturbed and the control rods to the main rotor hub remained connected.

The tail boom was separated from its mounting location and was found near the main wreckage. The tail rotor was still connected to the tail rotor gearbox and the tail rotor gearbox remained attached to the tailboom, which displayed minimal damage.

The instrument panel was bent forward. The panel light switch was in the "OFF" position, the beacon and position light switches were in the "ON" position, and the battery and alternator switches were in the "ON" position. The carburetor heat control lever was found to be about 1-inch travel from the "OFF" position stop, the fuel mixture control was in the "FULL RICH" position, the fuel shutoff control was in the off position (full in), and the magneto key switch was in the "BOTH" position. The trim switch was in the "RIGHT" position, the clutch control switch guard was open, and the clutch control switch was in the "ENGAGE" position. The circuit breakers for the trim, and clutch were both in. The fuel low caution light system was placarded as inoperative.

The 33-gallon fuel tank was impact damaged, there was no evidence of residual fuel, and the fuel tank filler cap was found hanging by its chain. The carburetor was impact damaged, and its float bowl was devoid of fuel. There was no odor of fuel, and no observed fuel blight (browning of vegetation) in the vicinity of the wreckage.

The airframe and all flight critical components were accounted for.

All four landing gear dampers were accounted for as well as the landing gear skids. The frame assembly had separated into multiple individual pieces. No evidence of failure was evident on all four of the cluster fittings. Both lower mast attach members were still attached to the mast and the airframe. The center mast attach fitting was separated at the mast attachment after retrieval from the wreckage site. The floor was separated from the cabin seat deck. The vertical fin was crushed, and the horizontal fin was separated from the helicopter. The leading edge of the horizontal fin displayed dents consistent with striking foliage.

The left seat belt system was still in place inside the helicopter while the right seat belt system was broken at its attach points. Both seat assemblies and interior components were accounted for. The instrument panel was intact but crushed in the back. The right control stick was broken at the fitting. The left control stick was not broken at the fitting. Both collective sticks were installed and accounted for.

The cyclic control was connected from both left and right sides to the swashplate assembly, but was not connected fore and aft due to an impact-fractured casting. The rod end was still attached to the casting.

The collective controls also appeared to have been connected before impact, as the attachment bolts and hardware was still in place. The primary collective casting was broken. The throttle cable also appeared to be connected before impact, as all the connecting hardware and portions of the cable remained attached to the carburetor.

The fuel shutoff was inoperable due to a severe bend in the cable but was connected to the fuel shutoff valve. The mixture control was operable but not attached to the carburetor. The

mixture control was in the full rich position and the fuel shutoff valve was in the open position.

The tail rotor drive shaft was sheared at the opening of the tail boom adjacent to the belt drive system. The drive shaft showed no twisting tendencies, but displayed creases in the drive shaft consistent with the helicopter falling through tree branches and debris landing on the tail boom. The attachment of the tail rotor drive shaft at the tail rotor gearbox was secure, the teeth of the tail rotor drive gear were intact, and the tail rotor gearbox chip detector was free of debris. There were no signs of impact on the leading edges of the tail rotor blades, and the blades remained attached to the tail rotor drive assembly.

The pitch control (PC) links for the tail rotor drive assembly were both intact and the swashplate assembly for the tail rotor drive operated freely. One PC link was bent and the other appeared undamaged. The rotating bearing for the tail rotor drive spun freely.

The eight belts that comprised the main belt drive assembly remained attached to the H-Frame pulley system. After removing the drive belts and the H-Frame assembly from the wreckage, it was confirmed that the upper pulley was installed with no anomalies and the sprag clutch was operable. The drive pulley and idler pulley showed no abnormal signs of operation, and the belt actuator was intact.

After removal of the blue and red main rotor blades from the main rotor's hub (the yellow blade had been previously removed during the wreckage recovery), examination revealed that the retainer showed signs of the pitch bearing assemblies and the blades being pulled up consistent with the main rotor falling through foliage. The blue and red pitch links were separated at the pitch bearing assemblies. The yellow pitch link remained attached, although the rod end at the pitch bearing attachment was bent at an approximate 90° angle, consistent with the helicopter falling through foliage with low or no rotation of the main rotor hub.

All three main rotor blades displayed little or no damage to the leading edges. Most of the damage was on the bottom sides of the blades, and the rear seams of the blades were separated and blown out at various positions.

The lower coupling drive shaft appeared in good condition with no noted anomalies. Both ends of the drive shaft were well lubricated. Three of the blades on the fan, which was attached to the engine flywheel, were broken. No indication of flywheel rotation during impact was observed, and the inside of the scroll did not display any rotational marks or scoring from the flywheel assembly.

The control tubes from the lower transmission housing to the swashplate assembly were intact. The control tube from the anti-torque pedals to the bellcrank was sheared and was separated from the bellcrank. The cables for the anti-torque system were separated and displayed evidence of tensile overload at the separations. The collective control was attached to the bellcrank, and the bellcrank displayed impact damage. The cyclic assembly was operational for the left and right inputs, but the forward and aft movement was restricted by a bellcrank that was impact damaged.

The fuel tank was impact damaged, with the upper and lower fittings for the fuel quantity and low fuel sensor separated from the tank. The fuel lines were present. Examination of the fuel sensor revealed the presence of corrosion on the fasteners, and corrosion on the FULL, EMPTY, and LOW ADJUST screws used to calibrate the unit. The aluminum probe shaft was missing. The side wires (apart from the ends, which were broken and corroded where they came out of the assembly) were also missing. The fuel line to the fuel pump was separated from the fitting.

Examination of the fuel strainer revealed debris inside the strainer; however, the screen was clear of obstructions. The aluminum tube was severed from the assembly. The supply hose was pulled away from the fitting, but was still attached to the lower fuel tank adapter plate. The fuel cap would attach to the fuel tank, but was heavily rusted and there was little or no positive friction to ensure that the cap would remain in place.

The engine remained partially attached to the airframe through the tubular engine mounts. The intake and exhaust tubes were partially crushed. The oil sump was fragmented and separated from the engine. Both magnetos were separated from the engine and were found dangling from the ignition harness. The left magneto mounting flange was fractured. The magneto was rotated by hand and produced spark from all four ignition towers. The right magneto mounting flange was also fractured. The magneto was rotated by hand and did not produce spark from any ignition tower. The magneto was partially disassembled and water was observed in the magneto. The magneto also displayed evidence of impact damage internally, as the gear brush was bent inward and not making contact, one of the coil wedges was loose, and the coil was loose in the frame.

The ignition harness was impact damaged, The Nos. 2, 3, and 4 top spark plugs, and the Nos. 2 and 4 bottom spark plugs exhibited gray coloration and worn normal condition. The No. 1 top spark plug was impact separated. The carburetor was fractured across the throttle bore, impact separated from the engine, and fragmented. The brass floats were intact, and no damage was noted. The carburetor fuel inlet screen was free of debris. The throttle and mixture control cables were separated from the carburetor.

The engine crankshaft was rotated by turning the cooling fan and continuity of the crankshaft to the rear gears was confirmed. Compression and suction were observed from the Nos. 1, 2, and 4 cylinders. The Nos. 1 and 3 cylinders displayed impact damage. Only faint compression and suction was observed from the No. 3 cylinder. The Nos. 1 and 3 cylinders were removed. No damage other than impact damage was noted to the cylinders, pistons, or valves, and the Nos. 1 and 3 connecting rods were free to rotate on the crankshaft. Continuity of the camshaft to the valvetrain was confirmed. Oil was observed in the engine, and the oil suction screen and oil filter media were absent of metallic debris.

MEDICAL AND PATHOLOGICAL INFORMATION

A Postmortem External Examination was performed on the student pilot by the Alabama department of Forensic Sciences. The cause of death was reported as multiple blunt force injuries.

Toxicological testing performed at the FAA Forensic Sciences Laboratory was negative for carboxyhemoglobin, ethanol, glucose, or drugs.

ADDITIONAL INFORMATION

Inoperative Equipment

According to the FAA, 14 CFR 91.213(d) allows certain 14 CFR Part 91 operators to fly an aircraft with inoperative instruments or equipment even though regulations generally require that all equipment installed on the aircraft be operative at the time of flight.

Some operators of aircraft, based on the kind of operation or size and type of aircraft are required to have a Minimum Equipment List (MEL) to operate the aircraft with inoperative instruments or equipment. However, operators of some types of helicopters can operate under part 91 without an MEL, such as small rotorcraft (12,500 pounds or less maximum certificated takeoff weight) for which a Master Minimum Equipment List (MMEL) has been developed.

The inoperative instruments and equipment cannot be:

- Part of the VFR-day type certification instruments and equipment prescribed in the airworthiness regulations under which the aircraft was type certificated
- Indicated as required on the aircraft's equipment list
- Indicated as required on the aircraft's Kinds of Operations Equipment List for the kind of flight operation being conducted
- Required by 14 CFR 91.205 (Powered civil aircraft with standard category U.S. airworthiness certificates: Instrument and equipment requirements.) or any other rule of 14 CFR part 91 for the specific kind of flight operation being conducted
- Required to be operational by an airworthiness directive

The inoperative instruments and equipment must be removed from the aircraft, the cockpit control placarded, and the maintenance recorded, or deactivated and placarded "Inoperative." If deactivation of the inoperative instrument or equipment involves maintenance, it must be accomplished and recorded in accordance with 14 CFR Part 43 (Maintenance, Preventive Maintenance, Rebuilding, and Alteration).

Finally, a pilot, who is certificated and appropriately rated under 14 CFR Part 61 (Certification: Pilots, Flight Instructors, and Ground Instructors), or a person, who is certificated and appropriately rated to perform maintenance on the aircraft, must determine that the inoperative instrument or equipment does not constitute a hazard to the aircraft.

Review of the FAA MMEL for the helicopter revealed that the fuel low caution light system was listed as "Repair Category C". According to the MMEL definitions issued by the FAA, "Items in this category shall be repaired within ten (10) consecutive calendar days (240 hours), excluding the day the malfunction was recorded in the aircraft maintenance record/logbook". Further review of the MMEL also indicated that the fuel low caution light, "May be inoperative provided procedures for monitoring fuel quantity are established and used."

Review of the helicopter's maintenance records did not reveal any entries regarding deferral of the fuel low caution light under the MMEL.

Additional Information from Flight Instructor

During an interview with the flight instructor on June 10, 2020, he expanded on the information he had provided advising that at the flight school they would usually refuel the helicopters before putting them away in the hangar. The last time that the accident helicopter flew before the day of the accident, was on May 25, 2020, and it was flown by him and the student pilot during a dual lesson. He was not sure who refueled the helicopter during that lesson.

On the morning of the accident prior to the dual lesson, the flight instructor, checked the fuel when he preflighted the helicopter, and then the student pilot preflighted the helicopter. The flight instructor noted that there appeared to be about 20 gallons of fuel in the fuel tank when he checked it.

Following that dual flight, the flight instructor performed a post-flight inspection and assisted the student pilot in refueling the helicopter. The flight instructor stated that he drove the refueling truck to the helicopter and remained in the truck while the student pilot refueled the helicopter. The flight instructor observed the student pilot place the nozzle in the fuel tank filler of the helicopter fuel tank and was carrying on a conversation with the student from the driver's seat of the fuel truck. The student pilot then told the instructor "Good to go" and gave a "thumbs up." The student pilot then placed the nozzle back on the fuel truck, the flight instructor turned off the pump on the fuel truck, and he drove away to park it. He did not observe the student pilot secure the fuel cap on the helicopter's fuel tank.

The flight instructor advised that fuel gauge worked on the helicopter, but it was not 100% accurate and that the low fuel lights also did not work on the accident helicopter and on the flight school's other operable Schweizer 269 – N2074C. He was unsure but thought that the low fuel light stopped working on N2074C first. A few months before the accident, the flight school placarded the low fuel lights on both helicopters inoperative. After the accident they removed the placard on N2074C.

The flight instructor also advised that fuel (100LL) was stored at the flight school in a 1,000-gallon tank. There was no meter on the tank, and he believed that there was no filter on the 1,000-gallon tank. They would transfer fuel from the 1,000-gallon tank to the fuel truck when the fuel truck tank was empty. The fuel truck had a filter and fuel drain but also did not have a meter. They had no set procedures for sumping the truck. They would just check it from time to time.

They would estimate the amount of fuel that was in the helicopters by using the fuel gauges and checking visually.

Additional Information from Flight School Owner

An FAA inspector spoke with the owner of the flight school and asked him about the placarded FUEL LOW caution light. The owner of the flight school told the inspector that several weeks before, they were doing an inspection and discovered the light inoperative. The mechanic then placarded the system. The owner of the flight school also explained that everyone knew the system was inoperative and as a policy, the aircraft are always rented with a full tank of fuel. The LOW FUEL caution light had been discovered during an inspection previously.

According to the owner of the flight school, the MMEL allowed the system to be inoperative. After reviewing the logbooks though, the inspector did not see any such related discrepancy entered. He then spoke with the mechanic who placarded the helicopter and asked him why he had not placed a discrepancy in the logbook. He said he thought it was more important to get it placarded first. He also stated that the helicopter had been running well, recently had a 25-hour inspection, and he had looked at the helicopter, the day of the mishap.

On June 15, 2020, in a letter to the FAA, the owner of the flight school advised the FAA that, he had only one Schweizer 269C-1 helicopter with a low fuel level caution light go inoperative, and that was on another helicopter which was recently repaired. He further advised that the caution placard that was placed in the accident helicopter was placed there by mistake, it was to be placed in N2074C, which in fact had a placard in it also. Additionally, he advised that the mechanic put one in each helicopter and that the low fuel light in the accident helicopter was functioning properly as was the fuel quantity gauge, that the fuel quantity gauge in 269C-1 helicopters were very accurate and reliable, and that when they received from the student pilot the information that that the low fuel caution light was inoperative in N2074C, they ordered a replacement sensor from Kinzie Industries. They were sent the wrong one so another was ordered but they had yet to receive it. On N2074C though, they were able to "repair and adjust" the one that was still installed on it now, so the low fuel caution was working.

The owner of the flight school also attached the maintenance procedures for working on the low fuel level sender which were photocopied pages from the Helicopter Maintenance Manual that when reviewed, were found to contain highlighted sections and signoffs by the mechanic in the margins of the pages, as well as dates of "29May20" and "3Jun20". Additionally, "N2074C Low Fuel Warn inop" was printed on one page and "N2074C Low fuel Warn" on another page. However, the owner of the flight school did not provide maintenance records from N2074C which indicated that the low fuel level caution light in N2074C had been deferred per the MMEL, and how the discrepancy had been cleared.

The owner of the flight school also stated that the procedures they employed in the event the low fuel level light was not working was to always refuel the helicopter between flight periods and the periods are to be no longer than 1.5 hours. With 32 gallons of fuel on board and a burn rate of 12-15 gallons per hour (worst case) for 1.5-hour flights, it would leave at least 1 hour of extra fuel.

Additionally, he stated that the MMEL clearly stated that having a low fuel caution light inoperative was allowed if you have a procedure for monitoring fuel quantity, and that they use the gauge in the helicopter which was fully operational and accurate, in addition to the hourly limit per flight period (1.5 hours). However, no written operational guidance that stated this

procedure was to be employed by Eagle Aviation Academy was provided by the owner of the flight school.

He also stated that as part of Eagle Aviation's Standard Operating Procedures for refueling the helicopter, the pilot in command (PIC) was responsible for fuel management before, during and after flight, and that once the student solos, they were responsible for all aspects of the flight because they were acting as the PIC.

Pilot Information

Certificate:	Commercial; Remote	**Age:**	45,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	Unmanned (sUAS)	**Restraint Used:**	4-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	February 15, 2019
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	(Estimated) 340 hours (Total, all aircraft), 67 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	Schweizer	**Registration:**	N9421P
Model/Series:	269C-1	**Aircraft Category:**	Helicopter
Year of Manufacture:	2000	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	0118
Landing Gear Type:	Skid	**Seats:**	2
Date/Type of Last Inspection:	April 4, 2020 100 hour	**Certified Max Gross Wt.:**	1750 lbs
Time Since Last Inspection:	38 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	5387.4 Hrs as of last inspection	**Engine Manufacturer:**	Lycoming
ELT:	Not installed	**Engine Model/Series:**	HO-360-G1A
Registered Owner:	Eagle Aviation Academy LLC	**Rated Power:**	180 Horsepower
Operator:	Eagle Aviation Academy LLC	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	HEY,318 ft msl	**Distance from Accident Site:**	5 Nautical Miles
Observation Time:	11:58 Local	**Direction from Accident Site:**	180°
Lowest Cloud Condition:		**Visibility**	10 miles
Lowest Ceiling:	Broken / 4100 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:		**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	30.02 inches Hg	**Temperature/Dew Point:**	30°C / 20°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Ozark, AL (71J)	**Type of Flight Plan Filed:**	None
Destination:	Midland City, AL (PVT)	**Type of Clearance:**	None
Departure Time:	12:31 Local	**Type of Airspace:**	Class G

Airport Information

Airport:	Ozark-Blackwell Field 71J	**Runway Surface Type:**	Asphalt
Airport Elevation:	357 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	31	**IFR Approach:**	None
Runway Length/Width:	5152 ft / 80 ft	**VFR Approach/Landing:**	Unknown

Wreckage and Impact Information

Crew Injuries:	1 Fatal	**Aircraft Damage:**	Destroyed
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	1 Fatal	**Latitude, Longitude:**	31.441389,-85.638336(est)

Administrative Information

Investigator In Charge (IIC):	Gunther, Todd
Additional Participating Persons:	Peter D Rose; FAA / FSDO; Birmingham, AL Craig Nielsen; Schweizer RSG LLC.; Fort Worth, TX James M Childers; Lycoming Engines; Williamsport, PA
Original Publish Date:	July 12, 2022
Last Revision Date:	
Investigation Class:	Class 3
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=101340