Aviation Investigation Final Report

Location:	Walla Walla, Washington	**Accident Number:**	WPR19LA049
Date & Time:	December 21, 2018, 13:30 Local	**Registration:**	N46147
Aircraft:	Taylorcraft L 2M	**Aircraft Damage:**	Substantial
Defining Event:	Fuel exhaustion	**Injuries:**	1 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot had just purchased the airplane. Before departing on the cross-country flight, he conducted preflight fuel planning based on the airplane's total fuel capacity and the fuel consumption rate as reported by the previous owner (16 gallons and 4 gallons per hour, respectively). The pilot reported that, about 30 minutes from the destination, the fuel quantity gauges "showed low fuel," but he thought he had adequate fuel onboard to reach the airport. About 15 minutes from the destination, the engine lost total power and the pilot performed a forced landing to a field. The airplane nosed down during the landing roll and came to rest upright, resulting in substantial damage to the engine firewall and mounts.

An industry expert for the accident airplane make/model and engine configuration indicated that the airplane's fuel consumption was likely about 6 gallons per hour and that the airplane had a total fuel capacity of 14 gallons. During a subsequent interview, the pilot reported that the loss of engine power was the result of fuel exhaustion. The pilot's reliance on the information provided by the previous owner likely contributed to his exhaustion of the available fuel.

Probable Cause and Findings

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

The pilot's improper preflight planning, which resulted in a total loss of engine power due to fuel exhaustion.

Findings

Personnel issues	Fuel planning - Pilot
Aircraft	Fuel - Fluid management

Factual Information

History of Flight

Enroute	Fuel exhaustion (Defining event)
Landing-landing roll	Collision with terr/obj (non-CFIT)

On December 21, 2018, about 1330 Pacific standard time, a Taylorcraft L-2M airplane, N46147, was substantially damaged when it was involved in an accident near Walla Walla, Washington. The commercial pilot was not injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The pilot reported that he departed with 16 gallons of fuel onboard and climbed to about 3,500 ft mean sea level (msl) at a 500 foot-per-minute (fpm) rate of climb. After experiencing about 30 minutes of rough air, the pilot climbed to 6,500 ft msl, also at a 500-fpm rate of climb, but could not find smooth air and returned to his original cruise altitude for the remainder of the flight. About 30 minutes from the destination, he noted that the fuel quantity gauges “showed low fuel,” but he thought that he had adequate fuel to make it to the airport. About 15 minutes from the destination, the engine "sputtered" and then lost all power. He verified that the oil temperature and pressure were normal and applied full throttle, rich mixture, carburetor heat, verified that the fuel selector was in the ON position, and that the magnetos were set to both. The pilot was unable to restore engine power and performed an off-airport landing to an open area. During the landing roll, the airplane nosed down and contacted the ground.

Examination of the airplane revealed substantial damage to the engine mounts and firewall. The recovery team that responded to the accident site reported that the fuel tanks and header tank were void of fuel and that the fuel system was not compromised.

The 1353 recorded weather observation at ALW included wind from 220° at 11 knots, 10 statute miles visibility, clear skies, temperature 06°C (43°F), dew point -01°C (30°F), and an altimeter setting of 30.13 inches of mercury.

The potential for carburetor ice was graphed using a carburetor ice chart from the Federal Aviation Administration's Special Airworthiness Information Bulletin CE-09-35, "Carburetor Ice Prevention," published on June 30, 2009. According to the chart, the airplane was at risk of serious icing at glide power and may have been at risk of serious icing at cruise power.

During a follow-up interview with the pilot, he reported that he may have experienced fuel exhaustion during the accident flight. According to the pilot, the previous owner informed him that the engine's average fuel consumption was 4 gallons per hour (gph); however, the pilot did not corroborate this information with another source, as the previous owner was experienced in building airplanes. Further, the owner also told the pilot that the airplane was equipped with two 6-gallon wing tanks and one 4-gallon header tank. The pilot fueled the airplane to capacity and completed his fuel performance computation based on a 16-gallon fuel capacity and 4 gph

fuel consumption. The previous owner furnished the pilot with historical records for the accident airplane; however, a flight manual was not among them. The pilot's total flight time en route was 2 hrs and 15 minutes, and he recalled leaning the fuel/air mixture out during cruise flight.

A fuel performance computation was completed using the flight plan information provided by the pilot. The airplane was equipped with a Continental O-200, air-cooled, reciprocating engine. According to an industry expert, the fuel consumption for this make/model and engine configuration is 5-6 gph or more.

Additionally, the total fuel quantity for the airplane was 14 gallons, as the header tank's capacity was actually 2 gallons, not 4 gallons. Based on these values, the airplane would have burned about 1.2 gallons in the approximate 12 minutes that elapsed during takeoff and while climbing to 3,500 ft, and then 6,500 ft at a 500 fpm rate of climb. This would have left the pilot with 12.8 total gallons of fuel for the remaining 2 hours and 3 minutes of flight, which equates to a fuel consumption of about 6.4 gph.

Pilot Information

Certificate:	Commercial	**Age:**	23,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Front
Other Aircraft Rating(s):	None	**Restraint Used:**	Lap only
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 1 With waivers/limitations	**Last FAA Medical Exam:**	December 22, 2017
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	January 8, 2018
Flight Time:	276 hours (Total, all aircraft), 1 hours (Total, this make and model), 171 hours (Pilot In Command, all aircraft), 5 hours (Last 90 days, all aircraft), 2 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Taylorcraft	**Registration:**	N46147
Model/Series:	L 2M No Series	**Aircraft Category:**	Airplane
Year of Manufacture:	1943	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	L5567
Landing Gear Type:	Tailwheel	**Seats:**	2
Date/Type of Last Inspection:	May 14, 2018 Annual	**Certified Max Gross Wt.:**	1325 lbs
Time Since Last Inspection:	9 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	1423 Hrs as of last inspection	**Engine Manufacturer:**	Continental
ELT:	C91 installed, activated, did not aid in locating accident	**Engine Model/Series:**	O-200-A
Registered Owner:		**Rated Power:**	100 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	ALW,1194 ft msl	**Distance from Accident Site:**	10 Nautical Miles
Observation Time:	13:53 Local	**Direction from Accident Site:**	180°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	11 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	220°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.12 inches Hg	**Temperature/Dew Point:**	6°C / -1°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Sandpoint, ID (SZT)	**Type of Flight Plan Filed:**	VFR
Destination:	Walla Walla, WA (ALW)	**Type of Clearance:**	Traffic advisory
Departure Time:	11:30 Local	**Type of Airspace:**	Class E

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 None	**Latitude, Longitude:**	46.232223,-118.224166(est)

Administrative Information

Investigator In Charge (IIC):	Stein, Stephen		
Additional Participating Persons:	Christopher Lang; FAA-FSDO; Spokane, WA		
Original Publish Date:	April 1, 2022	**Investigation Class:**	3
Note:	The NTSB did not travel to the scene of this accident.		
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=98819		