Aviation Investigation Final Report

Location:	Davis City, California	**Accident Number:**	WPR19LA160
Date & Time:	June 6, 2019, 19:30 Local	**Registration:**	N6617F
Aircraft:	Cessna 150	**Aircraft Damage:**	Substantial
Defining Event:	Fuel contamination	**Injuries:**	2 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot and passenger performed a preflight inspection of the airplane before the accident flight, during which they discovered water in the fuel. They sumped the fuel tanks until they observed water-free fuel samples then taxied the airplane to the airport's fuel island and filled the tanks to capacity, which totaled 26 gallons. They took multiple additional fuel samples after fueling the airplane and observed more water in the tanks. They continued to sump the tanks until no water was observed.

Despite evidence of severe water contamination, the pilot elected to proceed with the flight. Once airborne, they performed touch-and-go landings at multiple airports before they returned to their home airport. During the return flight, the pilot experienced a total loss of engine power, and, after unsuccessful attempts to restart the engine, the pilot performed a forced landing in a field near their home airport. The engine mount, firewall, and rudder were substantially damaged during the accident.

Examination of the airplane found evidence of water contamination in the right-wing tank and throughout the fuel system, which likely caused the engine to lose all power. The airplane had been stored outside for several months before the accident flight, at which time rain was likely introduced into the right-wing fuel tank, which did not form a proper seal. The mechanic who recently replaced the gasket and lanyard on the left wing may have erroneously notated the incorrect fuel tank in the aircraft logbook. The pilot proceeded with the flight despite the discovery of water contamination.

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 water contamination in the fuel, which resulted in a forced landing and collision with terrain. Contributing to the accident was the pilot's improper decision to proceed with the flight after discovering the contaminated fuel.

Findings

Aircraft	Fuel - Fluid management
Personnel issues	Decision making/judgment - Pilot

Factual Information

History of Flight

Enroute	Fuel contamination (Defining event)
Landing-flare/touchdown	Nose over/nose down
Landing-flare/touchdown	Collision with terr/obj (non-CFIT)

On June 6, 2019, about 1930 Pacific daylight time, a Cessna 150F, N6617F, was substantially damaged when it was involved in an accident near Davis, California. The private pilot and pilot-rated passenger were not injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The pilot stated that he borrowed the airplane from a friend for a flight with his son, a student pilot. During the preflight inspection, the pilot's son observed significant levels of water while sumping the fuel tanks and gascolator. He continued to drain the fuel tanks until he no longer observed any water contamination. They subsequently taxied the airplane to a fuel farm where they filled both fuel tanks with 100 low lead aviation grade gasoline, which totaled 26 gallons. The pilot's son sumped the fuel tanks again and observed more water. After five subsequent rounds of sumping the tanks, they began to observe water-free fuel samples. The pilot rocked the wings before he re-sumped the fuel tanks once more and did not observe any further water contamination.

They subsequently departed about 1730 and performed touch-and-go landings at multiple airports. While en route to an intermediate airport at 1,500 ft mean sea level, the pilot retarded the throttle so his son could practice his simulated engine failure emergency procedure. As the airplane reached 500 ft, the pilot asked his son to advance the throttle to full power, and he complied. The engine maintained full rpm without hesitation for about 40 seconds before the engine rpm dropped to about 1,000 rpm, and without pilot intervention. The pilot took control of the airplane, determined the engine was no longer producing power, and attempted to restart the engine while he established the airplane's published best glide speed. Unable to restart the engine, the pilot executed a forced landing in an open field. During landing the main landing gear impacted soft dirt during touchdown and the airplane nosed over and came to rest inverted.

Examination of the airplane by the Federal Aviation Administration (FAA) revealed damage to the engine firewall, engine mount, and rudder.

The engine's most recent overhaul was completed on February 17, 2019, 15.1 flight hours prior to the accident. An excerpt from the most recent annual inspection showed that fuel tank top skin panel hardware was replaced, along with the “right” fuel tank gasket and lanyards.

After the owner purchased the airplane, he stored it in a hangar from 2014 to March 2019 while it received an engine overhaul. During this time, the airplane was not flown. The airplane was then repositioned outside to a tiedown area where it was stored until the day of the accident. The pilot

reported that he had flown the airplane two times about a month prior to the accident and he had observed water in the fuel tanks when he sumped them before those flights.

According to the pilot's operating handbook, the airplane's gravity fed fuel system supplies fuel to the engine from the airplane's wing tanks through a fuel shut-off valve, fuel strainer, and carburetor.

An airframe and engine examination were performed at the airplane owner's hangar on July 26, 2019, by the engine manufacturer, with oversight from the National Transportation Safety Board investigator-in-charge.

Continuity of the fuel system was traced from the wings to the engine through the fuel lines at the wings, which had been capped after the wings were removed during recovery. The fuel tanks were not breached, and the fuel lines were not compromised. The gascolator fuel bowl contained a trace amount of liquid that tested positive for water. A white powdery residue was observed in the bowl. The carburetor fuel drain plug, and the bottom of the fuel bowl cavity were covered in a white powdery residue.

Both wings had been removed and stored in a hangar from the day of the accident to the date of the examination. A few ounces of liquid obtained from the right wing showed evidence of water contamination, while the residual liquid in the left wing was consistent with 100 low lead aviation grade gasoline. The left tank gasket and lanyard appeared to have been recently replaced, despite the maintenance records having indicated this work was performed on the right wing. The right-wing fuel tank flange that surrounded the fuel tank cap was rusted, and the gasket showed extensive long-term wear and did not form a proper seal. No other anomalies were noted with the engine or airframe during the examination.

The cumulative distance of the cross-country flight the pilot and passenger completed on the day of the accident was 118 nm and flew for about 2 hours before they experienced the total loss of engine power. According to the POH, the airplane can maintain cruise flight for 4 hours on 22.5 gallons of fuel at 75% power.

The fuel tanks used by the pilot to refuel the airplane before the accident flight were sumped daily, and the manager of the tanks stated they had never observed water contamination in their tanks nor had they received any complaints of a water contamination event.

A representative of the airplane manufacturer reported that it is possible for the engine to experience a delayed ingestion of water. When the fuel tanks are agitated, they hold water in suspension. After the water settles, there are areas in the wing where it can reside for long periods of time before the water is carried through the fuel system. Further, the fuel strainer, which is downstream of the fuel selector and fuel tanks, receives fuel from a port at the bottom and expels it from another port near the top of the strainer. If water is introduced into the fuel system and the strainer bowl is filled with water, the engine can ingest water and quit. This can happen after a few hours of flight.

Pilot Information

Certificate:	Private	**Age:**	55,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Sport pilot Without waivers/limitations	**Last FAA Medical Exam:**	June 7, 2019
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	October 5, 2017
Flight Time:	2306.6 hours (Total, all aircraft), 453 hours (Total, this make and model), 2306.6 hours (Pilot In Command, all aircraft), 50.4 hours (Last 90 days, all aircraft), 16.1 hours (Last 30 days, all aircraft), 1.5 hours (Last 24 hours, all aircraft)		

Student pilot Information

Certificate:	Student	**Age:**	17,Male
Airplane Rating(s):	None	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	None	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 3 Without waivers/limitations	**Last FAA Medical Exam:**	December 5, 2018
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	47 hours (Total, all aircraft), 40 hours (Total, this make and model), 47 hours (Pilot In Command, all aircraft), 14 hours (Last 90 days, all aircraft), 7 hours (Last 30 days, all aircraft), 1.5 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N6617F
Model/Series:	150 F	**Aircraft Category:**	Airplane
Year of Manufacture:	1966	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	15063217
Landing Gear Type:	Tricycle; Ski; Skid	**Seats:**	2
Date/Type of Last Inspection:	March 1, 2019 Annual	**Certified Max Gross Wt.:**	1600 lbs
Time Since Last Inspection:	15 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	4032.5 Hrs as of last inspection	**Engine Manufacturer:**	Continental
ELT:	C91 installed, not activated	**Engine Model/Series:**	O-200A
Registered Owner:	On file	**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:	68 ft msl	**Distance from Accident Site:**	
Observation Time:	17:20 Local	**Direction from Accident Site:**	
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	5 knots / None	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	220°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.76 inches Hg	**Temperature/Dew Point:**	35°C / 21°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Davis/Woodland/Winters, CA (DWA)	**Type of Flight Plan Filed:**	None
Destination:	Yolo County, CA (KDWA)	**Type of Clearance:**	None
Departure Time:	17:30 Local	**Type of Airspace:**	Class G

Airport Information

Airport:	University EDU	**Runway Surface Type:**	Dirt
Airport Elevation:	68 ft msl	**Runway Surface Condition:**	Dry
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	2 None	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 None	**Latitude, Longitude:**	38.525276,-121.703887(est)

Administrative Information

Investigator In Charge (IIC):	Stein, Stephen
Additional Participating Persons:	John Mitchell; Federal Aviation Administration; Sacramento, CA Kurt Gibson; Continental Aerospace Technologies; Mobile, AL
Original Publish Date:	May 3, 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=99566