



# Aviation Investigation Final Report

---

<b>Location:</b>	Riverside, California	<b>Accident Number:</b>	WPR21LA104
<b>Date &amp; Time:</b>	February 4, 2021, 12:50 Local	<b>Registration:</b>	N8107S
<b>Aircraft:</b>	Cessna 150	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>	Loss of engine power (total)	<b>Injuries:</b>	1 None
<b>Flight Conducted Under:</b>	Part 91: General aviation - Banner tow		

---

## Analysis

Toward the end of a banner-tow operation, the pilot made an approach to the runway and released the banner over the runway to prepare for landing. After releasing the banner, the pilot climbed the airplane to the traffic pattern altitude. While on final approach, she performed a go-around due to “extreme wind shear.” During climbout, the pilot made a left turn to the crosswind leg of the traffic pattern, and the engine lost partial power. She continued the left turn and turned back to the runway, intending to complete a forced landing. However, the pilot reported that a “strong and gusty” tailwind existed, and that the airplane’s speed was too fast to safely land, so she aborted the landing.

During the climb with partial engine power, the pilot made a 180° turn to the right with the intention of landing on the runway, but the engine lost total power halfway through the right turn. The airplane’s altitude during the right turn was insufficient for the pilot to reach the runway, so she made a forced landing onto a road located about 800 ft southeast of the runway threshold. During the descent, the elevator collided with trees, and the airplane landed upright on the asphalt surface. Subsequently, the nose landing gear collapsed, and the right wing collided with two cars that were parked on the right side of the road.

A postaccident examination of the airplane found the fuel selector in the OFF position. Examination of the fuel system revealed that the left and right wing fuel tanks and the auxiliary fuel tank were intact and not breached. The left wing fuel tank was empty, and the right wing fuel tank contained less than 1 gallon of fuel. The auxiliary fuel tank contained about 4 gallons of fuel, but the pilot did not use fuel from the auxiliary tank because she thought that the wing tanks contained about 10 to 12 gallons of fuel. Examination of the engine revealed no preimpact anomalies or malfunctions that would have precluded normal operation, and the engine operated through various speeds during an engine test run.

The accident pilot did not request nor received weather information from Leidos Flight Service, or the commercial vendor foreflight. There was no record of the accident pilot receiving or retrieving any other weather information before or during the accident flight.

A weather study revealed that at about the time of the accident winds in the vicinity of the accident were gusting to 21 knots at the accident time. The wind flow down the terrain helped to induce areas of low-level wind shear (LLWS) along with up and downdrafts. During a postaccident interview, the owner of the airplane reported that, given his experience flying the accident airplane, the fuel consumption rate during banner-tow operations was about 13 gallons per hour with high-wind conditions, such as those that occurred during the accident flight, because of the higher engine rpm during cruise flight. However, the pilot assumed a fuel consumption rate of 10 gallons per hour, which was below the fuel consumption rate that the owner experienced during banner-tow operations in cruise flight with calm wind (11 gallons per hour).

The weather study for this accident revealed that, about the time of the accident, the wind near the accident site was gusting to 21 knots. The wind flow down the terrain would have helped to induce areas of low-level windshear along with up- and downdrafts. One pilot report indicated that severe turbulence was occurring at 4,000 ft near the accident site at the accident time.

The weather conditions that occurred during the accident flight were addressed by the National Weather Service forecast conditions. However, the accident pilot did not request or receive weather information from Leidos Flight Service or Foreflight. Also, no evidence indicated that the accident pilot retrieved any other weather information before or during the accident flight. Thus, the pilot likely did not plan for windshear and turbulence during the flight, which likely created a higher pilot workload, increased fuel consumption during the flight, and resulted in fuel starvation and the total loss of engine power.

## **Probable Cause and Findings**

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

Fuel starvation due to the pilot's inadequate weather and fuel planning, which resulted in a total loss of engine power.

## Findings

<b>Personnel issues</b>	Fuel planning - Pilot
<b>Aircraft</b>	Fuel - Inadequate inspection
<b>Personnel issues</b>	Weather planning - Pilot
<b>Environmental issues</b>	Tree(s) - Effect on equipment
<b>Environmental issues</b>	Ground vehicle - Effect on equipment

## Factual Information

### History of Flight

Approach-VFR go-around	Loss of engine power (total) (Defining event)
------------------------	---

On February 4, 2021, about 1240 Pacific standard time, a Cessna 150F airplane, N8107S, sustained substantial damage when it was involved in an accident at Flabob Airport (RIR), Riverside, California. The commercial pilot was not injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 banner-tow flight.

The pilot reported that she fueled the airplane at Redlands Municipal Airport (REI), Redlands, California, with 15 gallons of 100low-lead fuel and conducted a 24-minute flight to RIR, where she initiated a banner-tow operation. The pilot stated that the airplane had a total of 42 gallons of fuel and that the planned duration of the banner-tow flight was 2 hours 20 minutes.

The pilot completed the banner-tow operation by making an approach to runway 6 at RIR and releasing the banner about midfield. She applied full power to join the pattern to land on runway 6. While on short final, the pilot elected to go around “due to extreme wind shear,” which she was experiencing.

The pilot reported that she applied full power, turned off the carburetor heat, retracted the flaps to 0°, and initiated a climb. The pilot also reported that, during the climbing left turn to the crosswind leg, the engine sputtered and lost partial power. The pilot completed the engine failure checklist, but the engine continued to sputter. She continued the left turn back to runway 6/24 and initiated an approach to land on runway 24.

The pilot further reported that a “strong and gusty” tailwind existed, and that the airplane’s speed was too fast to safely land on runway 24. As a result, the pilot aborted the landing on runway 24 and initiated a climb with “about 40%” of the engine’s available power. The pilot intended to continue the climb, make a 180° turn to the right, and initiate an approach to land on runway 6 because it had “favoring wind.” About halfway through the right turn back to runway 6, the airplane’s engine lost total power, and the propeller “completely stopped spinning.” The pilot attempted two aerial engine restarts that were unsuccessful.

When the airplane was about 300 ft above ground level, the pilot spotted a road that appeared to have no ground vehicle traffic, so she “attempted a normal landing.” She recalled that, during the descent to land, the airplane’s elevator was “ineffective” because of a collision with a tree. The airplane touched down upright on the asphalt surface, and the nose landing gear “immediately” collapsed. The airplane’s right wing impacted two parked cars on the right side

of the road, and the airplane then skidded about 500 ft to a stop. The various impacts resulted in substantial damage to the airplane's right wing, right elevator, nose landing gear, and nose.

A postaccident examination of the engine revealed no anomalies. An engine test run found that the engine ran at various speeds. The engine remained attached to the airframe during the test run and was rotated to a bank angle of 21° (to simulate fuel porting disruption) before the engine lost total power.

A postaccident examination of the airplane's fuel system revealed that the left and right wing fuel tanks and the auxiliary fuel tanks were intact and were not breached. Each wing tank's capacity was 19 gallons, 17.5 gallons of which were usable. The left tank contained no fuel, and the right tank contained less than 1/3 gallon. The auxiliary fuel tank's capacity was 15.5 gallons, 14.6 gallons of which were usable. The auxiliary fuel tank contained about 4 gallons of fuel. The fuel lines from the wing tanks to the fuel selector were intact, and the fuel selector was operational. Continuity from the fuel selector to the gascolator was confirmed. The gascolator sustained impact damage to the fuel line 90° fitting from the gascolator to the boost pump. No evidence indicated a significant loss of fuel on the ground under the gascolator at the accident site.

The fuel boost pump was connected to a supplemental fuel source, tested, and found to be operational.

The pilot provided her accident flight fuel planning calculations, which identified a fuel burn of 10 gallons per hour. She allocated 19 gallons of fuel per wing tank and 14 gallons of fuel in the auxiliary tank, for a total of 52 gallons of fuel. The pilot assumed that the airplane had used 28 gallons of fuel for the flight and that 24 gallons remained in the airplane. During a postaccident interview, the pilot reported that she did not use the fuel in the auxiliary tank and that she thought that there were 10 to 12 gallons of fuel remaining in the wing tanks.

The pilot also assumed a fuel consumption rate of 10 gallons per hour. During a postaccident interview, the owner of the airplane, reported that, from given his experience flying the accident airplane, the fuel consumption rate during banner-tow operations ranged between 11 gallons per hour in cruise flight with calm wind to 13 gallons per hour in high-wind conditions requiring a higher engine rpm during cruise flight.

The weather study conducted for this accident revealed that, about the time of the accident, wind near the accident site was gusting to 21 knots. The area forecast indicated that the wind over the terrain could induce areas of low-level windshear along with moderate up- and downdrafts, which were noted by many pilot reports for the area near the accident site at the accident time. One such report indicated that severe turbulence was occurring at an altitude of 4,000 ft.

The accident pilot did not request or receive weather information from Leidos Flight Service or ForeFlight. No evidence indicated that the accident pilot retrieved any other weather information before or during the accident flight.

## Pilot Information

<b>Certificate:</b>	Commercial; Flight instructor	<b>Age:</b>	22,Female
<b>Airplane Rating(s):</b>	Single-engine land; Multi-engine land	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	3-point
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	No
<b>Instructor Rating(s):</b>	Airplane single-engine	<b>Toxicology Performed:</b>	
<b>Medical Certification:</b>	Class 1 Without waivers/limitations	<b>Last FAA Medical Exam:</b>	August 19, 2020
<b>Occupational Pilot:</b>	Yes	<b>Last Flight Review or Equivalent:</b>	August 12, 2020
<b>Flight Time:</b>	(Estimated) 526 hours (Total, all aircraft), 125 hours (Total, this make and model), 460 hours (Pilot In Command, all aircraft), 120 hours (Last 90 days, all aircraft), 30 hours (Last 30 days, all aircraft), 5 hours (Last 24 hours, all aircraft)		

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Cessna	<b>Registration:</b>	N8107S
<b>Model/Series:</b>	150 F	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>	1965	<b>Amateur Built:</b>	
<b>Airworthiness Certificate:</b>	Utility	<b>Serial Number:</b>	15061707
<b>Landing Gear Type:</b>	Tricycle	<b>Seats:</b>	2
<b>Date/Type of Last Inspection:</b>	November 11, 2020 Unknown	<b>Certified Max Gross Wt.:</b>	1600 lbs
<b>Time Since Last Inspection:</b>	41.3 Hrs	<b>Engines:</b>	1 Reciprocating
<b>Airframe Total Time:</b>	7094 Hrs at time of accident	<b>Engine Manufacturer:</b>	Lycoming
<b>ELT:</b>	Installed	<b>Engine Model/Series:</b>	O-360-A4A
<b>Registered Owner:</b>		<b>Rated Power:</b>	
<b>Operator:</b>	On file	<b>Operating Certificate(s) Held:</b>	None

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Visual (VMC)	<b>Condition of Light:</b>	Day
<b>Observation Facility, Elevation:</b>	KRAL,819 ft msl	<b>Distance from Accident Site:</b>	3 Nautical Miles
<b>Observation Time:</b>	12:53 Local	<b>Direction from Accident Site:</b>	229°
<b>Lowest Cloud Condition:</b>		<b>Visibility</b>	8 miles
<b>Lowest Ceiling:</b>	Overcast / 2600 ft AGL	<b>Visibility (RVR):</b>	
<b>Wind Speed/Gusts:</b>	4 knots /	<b>Turbulence Type Forecast/Actual:</b>	/
<b>Wind Direction:</b>	50°	<b>Turbulence Severity Forecast/Actual:</b>	/
<b>Altimeter Setting:</b>	3000 inches Hg	<b>Temperature/Dew Point:</b>	13°C / 0°C
<b>Precipitation and Obscuration:</b>			
<b>Departure Point:</b>	Riverside , CA	<b>Type of Flight Plan Filed:</b>	None
<b>Destination:</b>	Riverside , CA	<b>Type of Clearance:</b>	VFR
<b>Departure Time:</b>		<b>Type of Airspace:</b>	Class G

## Airport Information

<b>Airport:</b>	Flabob Airport KRIR	<b>Runway Surface Type:</b>	Asphalt
<b>Airport Elevation:</b>	767 ft msl	<b>Runway Surface Condition:</b>	Dry
<b>Runway Used:</b>	06/24	<b>IFR Approach:</b>	None
<b>Runway Length/Width:</b>	3190 ft / 50 ft	<b>VFR Approach/Landing:</b>	Forced landing;Go around;Traffic pattern

## Wreckage and Impact Information

<b>Crew Injuries:</b>	1 None	<b>Aircraft Damage:</b>	Substantial
<b>Passenger Injuries:</b>		<b>Aircraft Fire:</b>	None
<b>Ground Injuries:</b>		<b>Aircraft Explosion:</b>	None
<b>Total Injuries:</b>	1 None	<b>Latitude, Longitude:</b>	33.985824,-117.41613(est)

## Administrative Information

<b>Investigator In Charge (IIC):</b>	Hicks, Michael		
<b>Additional Participating Persons:</b>	Rick Hernandez; FAA; Riverside, CA		
<b>Original Publish Date:</b>	December 6, 2022	<b>Investigation Class:</b>	3
<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=102603">https://data.nts.gov/Docket?ProjectID=102603</a>		

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](#).