Aviation Investigation Final Report

Location:	Selkirk, New York	**Accident Number:**	ERA14FA428
Date & Time:	September 8, 2014, 16:45 Local	**Registration:**	N79438
Aircraft:	Cessna 172	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (total)	**Injuries:**	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Instructional		

Analysis

The flight instructor and the light sport pilot, who was receiving training toward a private pilot certificate, were on an instructional flight in the airplane. Witnesses reported that, during takeoff, the airplane became airborne about 3/4 of the way down the 2,853-ft runway, and, when it was about 100 ft above the ground, the witnesses heard the engine lose power and subsequently regain it. One witness then heard the engine run "rough" and saw the airplane bank to the right and descend behind a treeline and out of view. Examination of the accident site indicated that the airplane impacted the side of a rail car parked on tracks beyond the end of the runway. The propeller blades displayed some leading edge damage and chordwise gouging, consistent with the engine producing partial power at the time of impact.

No preexisting mechanical anomalies were found that would have precluded normal airplane or engine operation. The airplane's fuel selector was found in the "both" position; however, it had been moved by a first responder who could not recall its original position. Both wing fuel tanks contained fuel that appeared to be 100 low lead aviation fuel and was absent of water and debris. The gascolator was destroyed, but the damaged carburetor contained a small amount of fuel, which was tested and found not to have water in it. The carburetor heat control was found in the "ON" position.

Fuel starvation due to an improperly positioned fuel selector could have resulted in the loss of engine power, and testing was conducted to determine if this was a possibility. There were no onboard recording devices, but airport security cameras captured segments of the airplane's start, taxi and takeoff roll. Using a similar airplane, the fuel selector was moved to the off position at various power settings, and the time it took for the engine to lose power was measured. Comparing these measurements to the times obtained from the security camera recordings indicated that the accident airplane's fuel selector could not have been turned to and remained in the off position during engine start or run-up. The timing comparisons did, however, indicate a possibility that the fuel selector could have been moved to the off position just before takeoff, which could have resulted in the loss of engine power. If this was the cause of the power loss, changing the position of the fuel selector in flight may have allowed the engine to

regain at least partial power before impact.

Diminished airflow through the carburetor due to carburetor ice also could have resulted in the loss of engine power. Temperature and dew point values were conducive to carburetor icing at taxi power settings. If carburetor ice formed during the airplane's taxi with the carburetor heat off, the additional engine heat from the application of takeoff power could have caused the ice to break off and block air flow during the airplane's initial climb, resulting in the loss of engine power. The subsequent addition of carburetor heat could then have melted some or all of the remaining ice and allowed the engine to regain at least partial power before impact. Although no preexisting mechanical anomalies could be found, the amount of damage to the airplane and the lack of recording devices precluded a definitive determination of how the engine power was lost and at least partially recovered.

Probable Cause and Findings

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

A loss of engine power for reasons that could not be determined because postaccident examination of the airframe and engine did not reveal any anomalies that would have precluded normal operation.

Findings

Not determined	(general) - Unknown/Not determined

Factual Information

History of Flight

Initial climb	Loss of engine power (total) (Defining event)
Emergency descent	Collision with terr/obj (non-CFIT)

HISTORY OF FLIGHT

On September 8, 2014, about 1645 eastern daylight time, a Cessna 172K, N79438, was substantially damaged when it impacted a parked railroad freight car, then terrain, in Selkirk, New York. The flight instructor and the sport pilot (under instruction for her private pilot certificate) were fatally injured. Visual meteorological conditions prevailed, and the airplane, which had just departed South Albany Airport (4B0), Selkirk, New York, was not operating on a flight plan. The instructional flight was conducted under the provisions of 14 Code of Federal Regulations Part 91.

According to a witness, the pilots told him that that they were going to fly to Columbia County Airport (1B1), Hudson, New York, and that the sport pilot was going to practice maneuvers for her upcoming practical test. The witness then saw the pilots get into the airplane, and while he was walking to his hangar, heard a "normal" engine run-up. He subsequently heard the airplane take off [from runway 19], and it "seemed normal." Shortly thereafter, the witness heard the engine "shut off [and] a second later it started back up." After another second, the witness heard a loud crash.

A second witness, who was outside the airport office, saw the airplane take off from runway 19, and after it reached an altitude of about 100 feet, the engine experienced a total loss of power. A few seconds later, the witness thought he heard the engine restart, then he heard a loud bang.

A third witness was standing by his parked airplane about 3/4 of the way down the runway. According to the witness, the accident airplane took off "normally" just past where the witness was standing, and when it had climbed to about 100 feet, the engine completely lost power. The airplane leveled, the engine started again, and the airplane continued climbing past the end of the runway. The engine then began to run "rough," and the airplane banked to the right. As it continued banking, the engine "lost most of its power," and the airplane descended while still in a bank. The airplane then disappeared below a tree line, and the witness heard a single, loud bang.

PERSONNEL INFORMATION

The flight instructor, age 48, held a commercial pilot certificate with airplane single engine land, airplane multiengine land and instrument airplane ratings. He also held a flight instructor certificate. His latest Federal Aviation Administration (FAA) first class medical certificate was issued on November 13, 2012. At the time, the flight instructor indicated 1,600 flight hours. Pilot logbook pages provided by a family member indicated, that as of June 23, 2014, a total flight time of 1,808 hours. Time in type and model could not be determined.

The pilot under instruction, age 61, held a sport pilot certificate. The pilot's logbook was photographed by an FAA inspector who reported the pilot's total time of 188 hours, with 81 hours in make and model. She was issued an FAA third class medical certificate on July 13, 2013.

AIRPORT INFORMATION

The airport had a single runway, designated 1/19, which was 2,853 feet long and 60 feet wide. Airport elevation was 196 feet. At the end of the runway 19 there was railroad switching yard. The taxiway in front of the airport office was about 550 feet from the beginning of the runway.

AIRCRAFT INFORMATION

The airplane was powered by a Lycoming O-320 engine powering a two-bladed metal propeller. The latest annual inspection was completed on June 28, 2014, at 10,639 hours in service.

According to the airplane's Owner's Manual, with the approximate ambient conditions and depending on weight, takeoff distance would have minimally been about 900 feet.

METEOROGICAL INFORMATION

The recorded weather at an airport about 11 nautical miles to the northeast, at 1651, included a few clouds at 6,000 feet, 10 statute miles visibility, winds from 160 degrees true at 10 knots, gusting to 14 knots, temperature 24 degrees C, dew point 9 degrees C, altimeter setting 30.32 inches Hg.

For the ambient temperature and dew point, a carburetor icing probability chart found in FAA Special Airworthiness Information Bulletin CE-09-35 indicated "serious icing at glide power."

WRECKAGE AND IMPACT INFORMATION

The airplane came to rest in the railroad yard, next to a line of double deck, covered, rail car automobile carriers (auto racks), in the vicinity of 42 degrees, 33.3 minutes north latitude, 073 degrees, 50.1 minutes west longitude. One of the rail cars had white paint transfer marks on its roof and side, which matched damage found on the underside of the left wing and the left wing strut. The side of the rail car also had an area that was indented, with a portion of the left side of the airplane's engine shroud embedded in it.

The airplane had significant fore-to-aft crush damage of the engine compartment. All of the airplane's flight control surfaces were located at the accident site, and flight control continuity was confirmed from the cockpit to all of those surfaces. The propeller blades had some leading edge damage and chordwise gouges.

The fuel selector was found in the "Both" position; however, one of the first responders stated that he had moved it, but could not recall in which direction, in an attempt to stop fuel from leaking. The carburetor air heat knob was found pulled out, to the "ON" position.

The left wing fuel cap was found hanging by its retaining chain, but first responders advised that it had been unscrewed to attempt to stem the fuel leak. In addition, there was no paint chipping consistent with the fuel cap flapping on the end of its chain during the flight.

Both wing fuel tanks contained fuel, that when drained, was blue in color and absent of water and debris. The gascolator was destroyed. The single fuel vent initially seemed blocked; however, once removed and sectioned, no blockage was found. Rubber vent coverings on both vented fuel caps were pliable and in good condition.

The engine did not exhibit any mechanical anomalies that would have precluded normal operation. Crankshaft continuity, cylinder compression and spark were all confirmed. Examination of the spark plug electrodes revealed that all were gray in color, except the bottom No. 3 cylinder spark plug, which was oil soaked. Compared to a Champion Aviation Check-A-Plug card, the seven non-soaked plugs appeared "Normal."

The carburetor was found separated at the oil sump flange, and the throttle arm was found broken on the throttle arm side of the throttle plate. The fuel line to the inlet side of the carburetor was broken about 14 inches from the inlet.

The carburetor bowl was separated from the carburetor, but no measurable amount of fuel was found in the bowl. A small amount of fuel was found in the accelerator pump cavity of the bowl. The fuel was tested with water-finding paste with no water indicated. The carburetor float mechanism and mixture needle were tested with air and found to operate without anomaly.

There were no recording devices onboard the airplane. In addition, the witness standing by the airport office did not hear any radio transmissions from the airplane, and the radio in the airport office did not have a recording capability.

TESTS AND RESEARCH

Security cameras at the airport captured portions of the taxi and takeoff, but not the event.

One recording showed the airplane being pulled out to an engine start position, the two pilots entering the airplane, engine startup, a taxi ahead from the start position to an engine run-up position in front of the airport office, the engine run-up, and taxi away from the run-up position.

The airplane subsequently departed the engine run-up position, turned left and almost immediately went out of view. It was next seen briefly during the takeoff roll, entering the left side of the frame and departing the right.

The preflight inspection of the airplane was not captured on the video.

A computer technician at the airport was able to time the starts and stops of the various events, which resulted in:

Startup to initial taxi: 55 seconds.
Engine run-up: 3 minutes, 51 seconds.
Taxiing from run-up area out of left side of frame, to reentering left side of the frame during takeoff roll: 2 minutes, 46 seconds.
Takeoff roll from left side of the frame out the right side: 3 seconds.
Witness coming into right side of frame after hearing the crash: 32 seconds.

Another Cessna 172, with the same engine model, was subsequently utilized to determine approximate times from fuel shut-off to engine stop. Results: at idle, about 48 seconds; at 1,700 rpm (engine run-up rpm): about 18 seconds; at full power: about 9 seconds.

MEDICAL AND PATHOLOGICAL INFORMATION

Autopsies were performed on both pilots at the Albany Medical Center, Albany, New York. Stated cause of death for both pilots was "multiple traumatic blunt force injuries," and the manner of death was "accident."

Toxicological testing was completed on both pilots at the FAA's Civil Aerospace. Medical Institute. No anomalies were noted for the flight instructor.

Results for the sport pilot included diphenhydramine, etomidate, lidocaine, and rosuvastatin in liver samples and in heart blood, ibuprofen in heart blood, and atropine in liver and kidney samples.

According to National Institute of Health online information, diphenhydramine is an antihistamine, ibuprofen is an analgesic, and rosuvastatin reduces cholesterol. The pilot had reported the latter two on her FAA medical application.

Lidocaine is a numbing agent, etomidate is an anesthesia, and atropine can be used to increase low heart rate; their concurrent administration typically reflects medical intervention.

Flight instructor Information

Certificate:	Commercial; Flight instructor	**Age:**	48,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Right
Other Aircraft Rating(s):		**Restraint Used:**	4-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane single-engine	**Toxicology Performed:**	Yes
Medical Certification:	Class 1 Without waivers/limitations	**Last FAA Medical Exam:**	November 13, 2012
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	October 11, 2013
Flight Time:	(Estimated) 1808 hours (Total, all aircraft)		

Pilot Information

Certificate:	Sport Pilot	**Age:**	61,Female
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	4-point
Instrument Rating(s):	None	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	Yes
Medical Certification:	Class 3 With waivers/limitations	**Last FAA Medical Exam:**	July 13, 2013
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	
Flight Time:	188 hours (Total, all aircraft), 81 hours (Total, this make and model)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N79438
Model/Series:	172 K	**Aircraft Category:**	Airplane
Year of Manufacture:	1969	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	17258087
Landing Gear Type:	Tricycle	**Seats:**	4
Date/Type of Last Inspection:	June 28, 2014 Annual	**Certified Max Gross Wt.:**	2299 lbs
Time Since Last Inspection:	40 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	10677 Hrs at time of accident	**Engine Manufacturer:**	LYCOMING
ELT:	C91A installed	**Engine Model/Series:**	0-320 SERIES
Registered Owner:	On file	**Rated Power:**	150 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:	ALB,285 ft msl	**Distance from Accident Site:**	11 Nautical Miles
Observation Time:	16:51 Local	**Direction from Accident Site:**	20°
Lowest Cloud Condition:	Few / 6000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	10 knots / 14 knots	**Turbulence Type Forecast/Actual:**	/ None
Wind Direction:	160°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.31 inches Hg	**Temperature/Dew Point:**	24°C / 9°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Selkirk, NY (4B0)	**Type of Flight Plan Filed:**	None
Destination:	Selkirk, NY (4B0)	**Type of Clearance:**	None
Departure Time:	16:45 Local	**Type of Airspace:**	Class G

Airport Information

Airport:	South Albany Airport 4B0	**Runway Surface Type:**	Asphalt
Airport Elevation:	196 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	19	**IFR Approach:**	None
Runway Length/Width:	2853 ft / 60 ft	**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	2 Fatal	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	2 Fatal	**Latitude, Longitude:**	42.556388,-73.916664

Administrative Information

Investigator In Charge (IIC):	Cox, Paul
Additional Participating Persons:	Peter LaCagnina; FAA/FSDO; Albany, NY Henry Soderlund; Textron Aviation; Wichita, KS Judson Rupert; Textron Lycoming ; Williamsport, PA
Original Publish Date:	November 17, 2016
Last Revision Date:	
Investigation Class:	Class
Note:	The NTSB traveled to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=90045