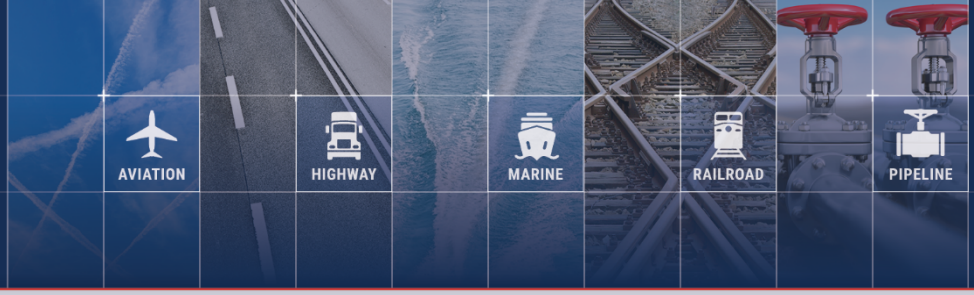

Aviation Investigation Final Report

Location:	Iliamna, Alaska	**Accident Number:**	ANC18LA064
Date & Time:	August 7, 2018, 12:15 Local	**Registration:**	N7379U
Aircraft:	Cessna 207	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (total)	**Injuries:**	1 None
Flight Conducted Under:	Part 135: Air taxi & commuter - Non-scheduled		

Analysis

The pilot reported that shortly after takeoff, as he began to configure the airplane for cruise flight, the engine began to run rough and lose power, and he elected to immediately return to the airport. The engine subsequently lost total power and the pilot performed a forced landing on tundra-covered terrain, during which the airplane sustained substantial damage.

Examination revealed that the No. 2 piston was eroded on the bottom side, and a hole was burned through. The No. 2 piston and cylinder head were mechanically damaged by loose piston ring debris. Closer examination of the No. 2 cylinder head revealed re-solidified molten metal around the bottom Heli-Coil tang notch. All damage discovered was consistent with a pre-ignition/detonation event; however, the cause of the pre-ignition and/or detonation could not be determined based on the available information.

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 detonation/preignition damage of the No. 2 cylinder and piston for reasons that could not be determined.

Findings

Aircraft	Recip eng cyl section - Damaged/degraded
Aircraft	(general) - Failure

Factual Information

History of Flight

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

On August 7, 2018, about 1215 Alaska daylight time, a Cessna 207 airplane, N7379U, was substantially damaged when it was involved in an accident near Iliamna, Alaska. The pilot was not injured. The airplane was operated as a Title 14 *Code of Federal Regulations* (CFR) Part 135 flight.

The pilot reported that, after takeoff, he started a climbing left turn toward his destination. As the airplane reached his intended altitude of 1,000 ft mean sea level, and as he began to configure the airplane for cruise flight, the engine began to run rough and lose power, so he elected to immediately return to the departure airport. He switched fuel tanks and activated the auxiliary fuel pump in an effort to restore full engine power. He noted that the engine roughness improved momentarily, followed by a severe engine vibration and complete loss of engine power. The pilot selected a forced landing area on tundra-covered terrain, during which the airplane sustained substantial damage to the fuselage and wings.

The airplane was subsequently recovered and returned to the operator's base. A Federal Aviation Administration inspector reported that there was no obvious damage to the engine, and an engine run was attempted. Although the engine eventually started, it ran very rough and began to vibrate and the test was discontinued. The engine was sent to the manufacturer's facility for further examination.

The examination revealed that the No. 2 piston was eroded on the bottom side, and a hole was burned through. The No. 2 piston and cylinder head were mechanically damaged by loose piston ring debris. Closer examination of the No. 2 cylinder head revealed re-solidified molten metal around the bottom Heli-Coil tang notch. All damage discovered was consistent with a pre-ignition/detonation event. The cause of the preignition and/or detonation could not be determined.

The Pilot's Handbook of Aeronautical Knowledge (FAA-H-8083-25B), states, in part:

"Detonation is an uncontrolled, explosive ignition of the fuel/air mixture within the cylinder's combustion chamber. It causes excessive temperatures and pressures which, if not corrected, can quickly lead to a failure of the piston, cylinder, or valves. In less severe cases, detonation causes engine overheating, roughness, or loss of power."

"Preignition occurs when the fuel/air mixture ignites prior to the engine's normal ignition event. Premature burning is usually caused by a residual hot spot in the combustion chamber, often created by a small carbon deposit on a spark plug, a cracked spark plug insulator, or other damage to the cylinder that causes a part to heat sufficiently to ignite the fuel/air charge."

Pilot Information

Certificate:	Airline transport	**Age:**	60,Male
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	4-point
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	Airplane single-engine	**Toxicology Performed:**	No
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	April 1, 2018
Occupational Pilot:	Yes	**Last Flight Review or Equivalent:**	
Flight Time:	10000 hours (Total, all aircraft), 1 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Cessna	**Registration:**	N7379U
Model/Series:	207	**Aircraft Category:**	Airplane
Year of Manufacture:	1978	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	20700427
Landing Gear Type:	Tricycle	**Seats:**	
Date/Type of Last Inspection:	100 hour	**Certified Max Gross Wt.:**	3803 lbs
Time Since Last Inspection:	51.2 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	18642.1 Hrs at time of accident	**Engine Manufacturer:**	Continental
ELT:	C126 installed, activated, did not aid in locating accident	**Engine Model/Series:**	IO 520 SERIES
Registered Owner:		**Rated Power:**	285 Horsepower
Operator:		**Operating Certificate(s) Held:**	Commuter air carrier (135), On-demand air taxi (135)

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	Ill,192 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	11:53 Local	**Direction from Accident Site:**	360°
Lowest Cloud Condition:	Few / 3400 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Broken / 6500 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	10 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	320°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.75 inches Hg	**Temperature/Dew Point:**	12.8°C
Precipitation and Obscuration:			
Departure Point:	Iliamna, AK	**Type of Flight Plan Filed:**	Company VFR
Destination:	Kokhanok, AK (9K2)	**Type of Clearance:**	None
Departure Time:		**Type of Airspace:**	

Airport Information

Airport:	Iliamna Airport PAIL	**Runway Surface Type:**	
Airport Elevation:	192 ft msl	**Runway Surface Condition:**	Soft
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	1 None	**Latitude, Longitude:**	59.745834,-154.91749

Administrative Information

Investigator In Charge (IIC):	Johnson, Clinton		
Additional Participating Persons:	Jack Devlin; Federal Aviation Administration ; Anchorage , AK Nicole Charnon; Continental Motors ; Mobile, AL		
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=98036		