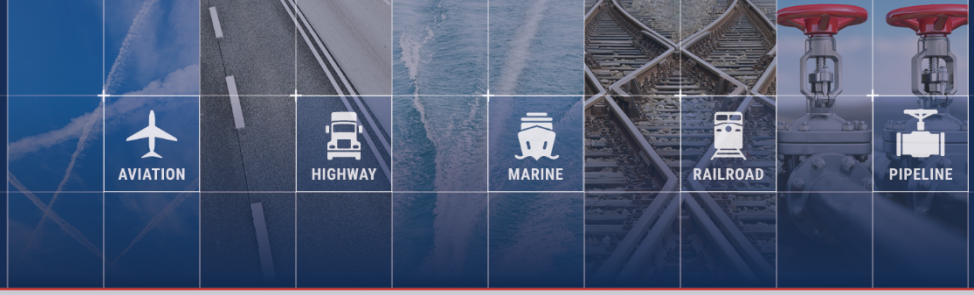

Aviation Investigation Final Report

Location:	Greenville, North Carolina	**Accident Number:**	ERA23LA218
Date & Time:	May 5, 2023, 09:00 Local	**Registration:**	N180LR
Aircraft:	Piper PA-28-180	**Aircraft Damage:**	Substantial
Defining Event:	Loss of engine power (total)	**Injuries:**	2 Serious
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot made a forced landing in a swamp after the engine lost complete power. The landing resulted in substantial damage to the airplane and serious injuries to both occupants. Postaccident examination of the engine found large amounts of metallic flakes and debris in the oil filter and oil sump screen. When the engine was disassembled, wear was noted on the camshaft lobes and associated lifters, and the No. 2 aft piston pin plug. The No. 2 forward piston plug was missing and metal shavings consistent with the plug were found in the oil suction sump screen. Metallurgical examination of engine components revealed damage consistent with the engine operating at high operating temperatures due to a lack of lubrication and hard contact damage after the No. 3 connecting rod released during operation. No preexisting material failures were identified. Therefore, the wear noted in the engine most likely became excessive, and over time produced metal shavings and debris that collected in the oil screen, which led to oil starvation. The bearings and connecting rods overheated, which resulted in the release of the No. 3 connecting rod from its crankshaft journal during engine operation.

A review of the engine maintenance records revealed the oil had been changed and the filter replaced but had not been checked for about 8 months before the accident. Per a Mandatory Service Bulletin released by the engine manufacturer, titled "*Oil Servicing, Metallic Solids Identification After Oil Servicing, and Associated Corrective Action,*" the oil filter and oil sump suction screen were to be checked after each oil change. This check was to see if the engine was being contaminated with metallic particles due to excessive wear and to help prevent a future engine failure. In addition, the engine manufacturer recommended the engine be overhauled every 12 years or 2,000 hours to "*mitigate engine deterioration that occurs with age, including corrosion of metallic components…*" Engine maintenance records indicated the

engine was last overhauled about 21 years before the accident, and had accrued 2,118.5 hours of operation at the time of the accident. As such, the engine was 9 years past its recommended overhaul interval and 118 hours over the recommended time in service. Had the airplane operator overhauled the engine as recommended by the engine manufacturer, and if maintenance personnel checked the oil filter/and oil sump suction screen in the months leading up to the accident, it is likely they would have observed metallic debris being produced by the engine due to excessive wear. Both actions would likely have prevented the engine failure due to oil starvation.

Probable Cause and Findings

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

Inadequate maintenance by the operator and maintenance personnel, which resulted in a loss of engine power due to oil starvation.

Findings

Aircraft	(general) - Failure
Aircraft	Recip eng oil sys - Failure
Personnel issues	Scheduled/routine maintenance - Owner/builder
Personnel issues	Scheduled/routine maintenance - Maintenance personnel
Aircraft	(general) - Inadequate inspection

Factual Information

History of Flight

Approach-VFR pattern final	Loss of engine power (total) (Defining event)
Emergency descent	Off-field or emergency landing
Emergency descent	Collision with terr/obj (non-CFIT)

On May 5, 2023, at 0900 eastern daylight time, a Piper PA-28-180 airplane, N180LR, was substantially damaged when it was involved in an accident near Greenville, North Carolina. The private pilot and the passenger were seriously injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The pilot reported that he had rented the airplane from a flight school located at the Piedmont Triad International Airport (GSO), Greensboro, North Carolina, and planned to fly to the Pitt-Greenville Airport (PGV), Greenville, North Carolina. He conducted a thorough preflight examination of the airplane and found nothing abnormal. Both wing fuel tanks were full, and the engine started and ran normally during all run-up checks. He and his passenger then departed about 0800. The pilot said when he was about 10 miles from PGV, at an altitude of about 4,000 ft mean sea level (msl), he noticed a gradual loss in engine rpm. He tried to add power with the throttle, but there was no response. The pilot also applied carburetor heat, but there was no discernable difference in engine rpm. The engine continued to rapidly lose rpm before it finally stopped producing all power. The pilot trimmed the airplane for best glide speed and landed about a ¼-mile short of PVG in a swamp. The pilot said he observed the oil pressure light flashing on the instrument panel a few seconds before touchdown.

Examination of the engine revealed a large amount of metallic debris in the oil filter and in the oil sump suction screen. When the oil sump was removed, there were numerous pieces of metallic debris sitting in the sump and there was a large hole in the bottom of the crankcase. When the engine was disassembled, the No. 3 connecting rod was found damaged where it connected to the crankshaft journal and its cap was heavily fractured. The No. 2 cylinder forward piston pin plug was missing, and the aft pin plug exhibited preimpact wear up into the oil control ring land. A review of the debris found inside the oil sump suction screen, revealed metal shavings consistent with the missing forward piston pin plug.

The Nos. 3 and 4 camshaft lobes exhibited wear and two of their corresponding lifters were pitted and concave, consistent with preimpact wear. The main journal bearings exhibited wear, scoring, and discoloration. The connecting rod journals and their respective bearings also exhibited scoring and discoloration.

The crankshaft, connecting rods and associated bearings, the main journal bearings, and the oil filter screen with metallic flakes were sent to the National Transportation Safety Board's Materials Laboratory for further examination. Examination of these components revealed damage consistent with the engine operating at high operating temperatures due to a lack of lubrication and hard contact damage after the No. 3 connecting rod released during operation. No preexisting material failures were identified.

A review of engine maintenance records revealed the engine's last annual inspection was completed on April 26, 2023. At the time of the accident, the engine had accrued a total of 2,118.5 hours since it was overhauled on September 7, 2002, almost 21 years before the accident.

According to Lycoming Service Instruction No. 1009BE, "*TIME BETWEEN OVERHAUL (TBO) SCHEDULES,*" the engine should have been overhauled when it had accumulated 2,000 hours in service or within 12 calendar years of the date it first entered service or of its last overhaul, "*to mitigate engine deterioration that occurs with age, including corrosion of metallic components…*"

On January 5, 2023, a maintenance entry was made in the engine logbook indicating there was a "*intermittent variation in power of the engine*" during a cross-country flight. A mechanic replaced the Nos. 1 and 2 exhaust gaskets, a missing exhaust nut, and added new washers to the Nos. 1 and 2 cylinder exhaust studs. The engine was test run, and it ran rough with a low exhaust gas temperature indication on the No. 2 cylinder. The No. 2 cylinder valve cover was removed, and a broken valve spring was replaced. The engine was test-run, and the airplane was returned to service. There were no entries indicating that the oil filter or oil sump suction screen were checked for metal debris.

Further examination of the engine maintenance logbook revealed the last time the oil filter was checked was on September 1, 2022, about 8 months before the accident. The airplane then had three 100-hr inspections and an annual inspection before the accident. Each inspection included an entry that said, "*Changed oil and filter*." There was no entry that said the oil filter was opened and checked. Per Lycoming Mandatory Service Bulletin 480F, "*Oil Servicing, Metallic Solids Identification After Oil Servicing, and Associated Corrective Action,*" the oil filter and oil sump suction screen are to be checked after each oil change. The purpose of checking the oil filter is to check for metal debris that would indicate excessive wear in the engine and the potential for a future engine failure. The log entries also did not note a check of the oil sump suction screen at these oil changes.

Pilot Information

Certificate:	Private	**Age:**	24,Male
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Lap only
Instrument Rating(s):	None	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	
Medical Certification:	Class 1 Without waivers/limitations	**Last FAA Medical Exam:**	April 14, 2023
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	December 5, 2023
Flight Time:	61.3 hours (Total, all aircraft), 61.3 hours (Total, this make and model), 19.2 hours (Pilot In Command, all aircraft), 1.3 hours (Last 90 days, all aircraft), 0 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N180LR
Model/Series:	PA-28-180	**Aircraft Category:**	Airplane
Year of Manufacture:	1962	**Amateur Built:**	
Airworthiness Certificate:	Utility	**Serial Number:**	28-872
Landing Gear Type:	Tricycle	**Seats:**	4
Date/Type of Last Inspection:	April 26, 2023 100 hour	**Certified Max Gross Wt.:**	2400 lbs
Time Since Last Inspection:	22 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	5362 Hrs at time of accident	**Engine Manufacturer:**	Lycoming
ELT:	C91A installed, not activated	**Engine Model/Series:**	O-360-A3A
Registered Owner:	Unlimited Possibilities Aviation LLC	**Rated Power:**	160 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:	PGV,25 ft msl	**Distance from Accident Site:**	1 Nautical Miles
Observation Time:	09:05 Local	**Direction from Accident Site:**	80°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	/	**Turbulence Type Forecast/Actual:**	None / None
Wind Direction:		**Turbulence Severity Forecast/Actual:**	N/A / N/A
Altimeter Setting:	30.22 inches Hg	**Temperature/Dew Point:**	15°C / 11°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Greesnboro, NC (GSO)	**Type of Flight Plan Filed:**	VFR
Destination:	Greenville, NC (PGV)	**Type of Clearance:**	VFR flight following
Departure Time:	08:00 Local	**Type of Airspace:**	Class E

Airport Information

Airport:	PITT-GREENVILLE PGV	**Runway Surface Type:**	Concrete
Airport Elevation:	26 ft msl	**Runway Surface Condition:**	Vegetation;Wet
Runway Used:	08	**IFR Approach:**	None
Runway Length/Width:	4997 ft / 150 ft	**VFR Approach/Landing:**	Forced landing;Full stop

Wreckage and Impact Information

Crew Injuries:	1 Serious	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 Serious	**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	2 Serious	**Latitude, Longitude:**	35.630829,-77.398041

Administrative Information

Investigator In Charge (IIC):	Read, Leah
Additional Participating Persons:	Lynda Falcon; FAA/FSDO; Greensboro, NC Jonothon Hirsch; Piper Aircraft Company Mike Childers; Lycoming
Original Publish Date:	March 19, 2025
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=109776