



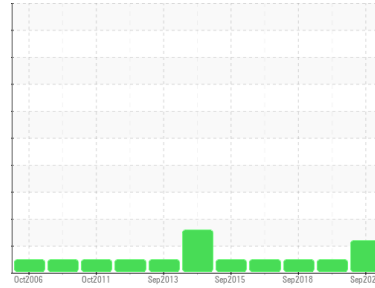
PROBLEM SUMMARY

Sample Rating Trend

FUEL

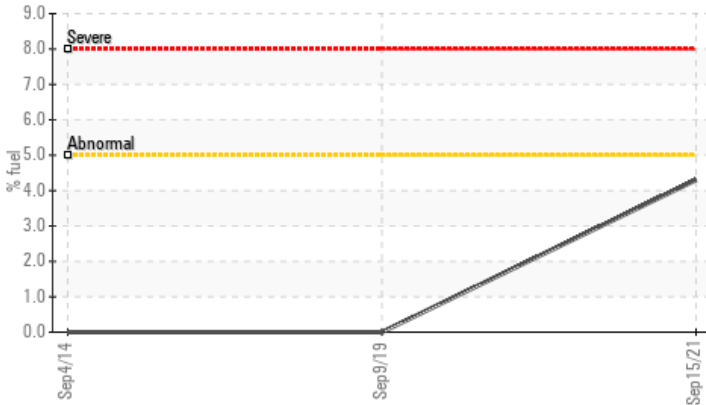


Machine Id
CATERPILLAR 81Z12792
 Component
Diesel Engine
 Fluid
ROYAL PURPLE MOTOR OIL 15W40 (19 GAL)

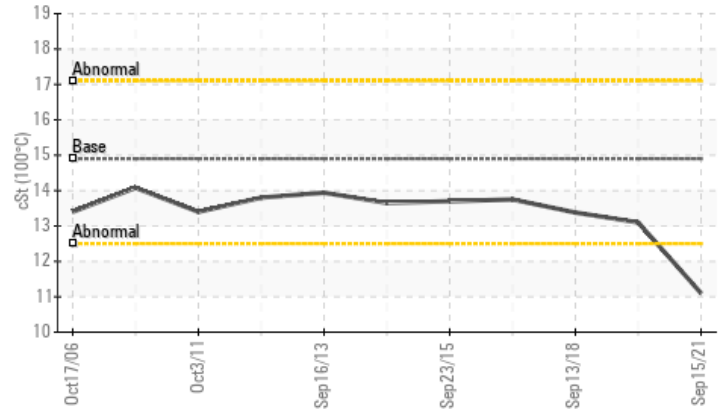


COMPONENT CONDITION SUMMARY

▲ Fuel Dilution



▲ Viscosity @ 100°C



RECOMMENDATION

We advise that you check the fuel injection system. The oil change at the time of sampling has been noted. Resample at the next service interval to monitor.

PROBLEMATIC TEST RESULTS

Sample Status				ABNORMAL	NORMAL	NORMAL
Fuel	%	ASTM D3524	>5	▲ 4.3	<1.0	<1.0
Visc @ 100°C	cSt	ASTM D445	14.9	▲ 11.1	13.1	13.38

Customer Id: GRAGRARP
 Sample No.: RP181808
 Lab Number: 05354166
 Test Package: IND 2



To manage this report scan the QR code

To discuss the diagnosis or test data:
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jhester@wearcheckusa.com

To change component or sample information:
 Customer Service +1 1-800-237-1369
customerservice@wearcheck.com

RECOMMENDED ACTIONS

Action	Status	Date	Done By	Description
Check Fuel/injector System	MISSED	Oct 21 2022	?	We advise that you check the fuel injection system.

HISTORICAL DIAGNOSIS

09 Sep 2019 Diag: Don Baldrige

NORMAL



Resample at the next service interval to monitor. All component wear rates are normal. There is no indication of any contamination in the oil. The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.

view report



13 Sep 2018 Diag: Jonathan Hester

NORMAL



Resample at the next service interval to monitor. All component wear rates are normal. There is no indication of any contamination in the oil. The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.

view report



20 Sep 2016 Diag: Doug Bogart

NORMAL



Resample at the next service interval to monitor. Metal levels are typical for a new component breaking in. There is no indication of any contamination in the component. The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.

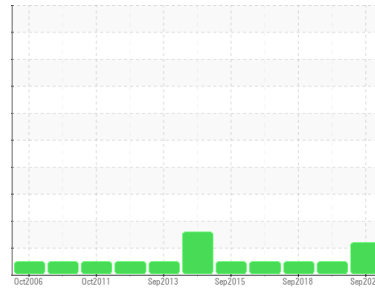
view report





OIL ANALYSIS REPORT

Sample Rating Trend



FUEL



Machine Id
CATERPILLAR 81Z12792
 Component
Diesel Engine
 Fluid
ROYAL PURPLE MOTOR OIL 15W40 (19 GAL)

DIAGNOSIS

▲ Recommendation

We advise that you check the fuel injection system. The oil change at the time of sampling has been noted. Resample at the next service interval to monitor.

Wear

All component wear rates are normal.

▲ Contamination

There is a moderate amount of fuel present in the oil.

▲ Fluid Condition

Fuel is present in the oil and is lowering the viscosity. The BN result indicates that there is suitable alkalinity remaining in the oil.

SAMPLE INFORMATION

	method	limit/base	current	history1	history2
Sample Number	Client Info		RP181808	RP181795	RP145269
Sample Date	Client Info		15 Sep 2021	09 Sep 2019	13 Sep 2018
Machine Age	hrs	Client Info	827	768	740
Oil Age	hrs	Client Info	550	323	295
Oil Changed	Client Info		Changed	Not Changd	Not Changd
Sample Status			ABNORMAL	NORMAL	NORMAL

CONTAMINATION

	method	limit/base	current	history1	history2
Glycol	WC Method		NEG	NEG	NEG

WEAR METALS

	method	limit/base	current	history1	history2
Iron	ppm	ASTM D5185m >100	13	34	36
Chromium	ppm	ASTM D5185m >20	<1	<1	<1
Nickel	ppm	ASTM D5185m >2	0	<1	<1
Titanium	ppm	ASTM D5185m >2	<1	0	0
Silver	ppm	ASTM D5185m >2	2	0	0
Aluminum	ppm	ASTM D5185m >25	1	3	3
Lead	ppm	ASTM D5185m >40	1	4	4
Copper	ppm	ASTM D5185m >330	68	258	272
Tin	ppm	ASTM D5185m >15	<1	3	3
Antimony	ppm	ASTM D5185m	<1	0	0
Vanadium	ppm	ASTM D5185m	0	0	0
Cadmium	ppm	ASTM D5185m	<1	<1	0

ADDITIVES

	method	limit/base	current	history1	history2
Boron	ppm	ASTM D5185m 0	63	24	25
Barium	ppm	ASTM D5185m 0	0	0	0
Molybdenum	ppm	ASTM D5185m 100	46	84	88
Manganese	ppm	ASTM D5185m	<1	<1	<1
Magnesium	ppm	ASTM D5185m 60	343	130	139
Calcium	ppm	ASTM D5185m 3050	1717	2933	3144
Phosphorus	ppm	ASTM D5185m 1050	746	971	1064
Zinc	ppm	ASTM D5185m 1200	895	1154	1243

CONTAMINANTS

	method	limit/base	current	history1	history2
Silicon	ppm	ASTM D5185m >25	5	6	4
Sodium	ppm	ASTM D5185m	3	6	7
Potassium	ppm	ASTM D5185m >20	0	2	3
Fuel	%	ASTM D3524 >5	▲ 4.3	<1.0	<1.0
Water	%	ASTM D6304 >0.2	---	0.102	---
ppm Water	ppm	ASTM D6304 >2000	---	1020	---

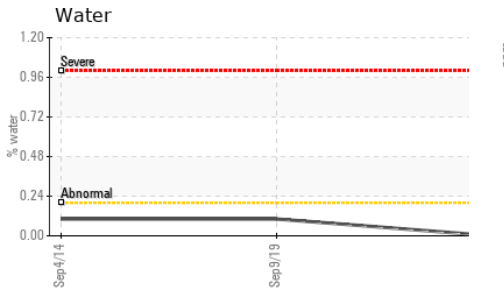
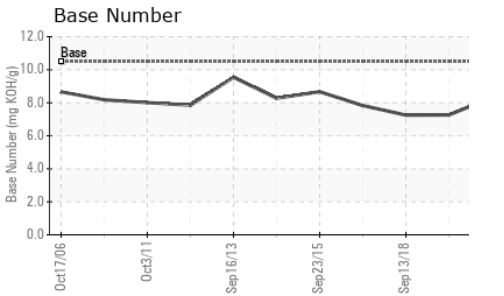
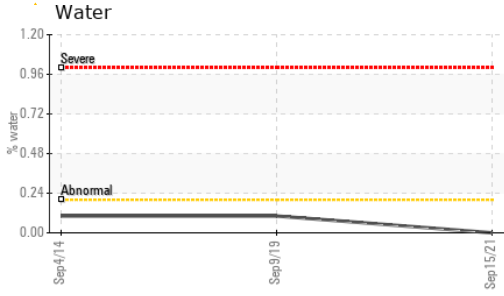
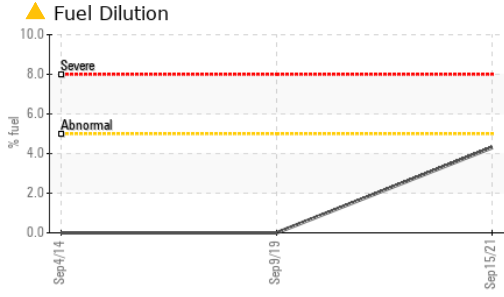
INFRA-RED

	method	limit/base	current	history1	history2
Soot %	%	*ASTM D7844 >3	0.1	0.2	0.3
Nitration	Abs/cm	*ASTM D7624 >20	7.3	12.1	11.7
Sulfation	Abs/.1mm	*ASTM D7415 >30	24.5	31.8	31.3

FLUID DEGRADATION

	method	limit/base	current	history1	history2
Oxidation	Abs/.1mm	*ASTM D7414 >25	20.5	23.2	23.4
Base Number (BN)	mg KOH/g	ASTM D2896 10.5	8.31	7.26	7.25

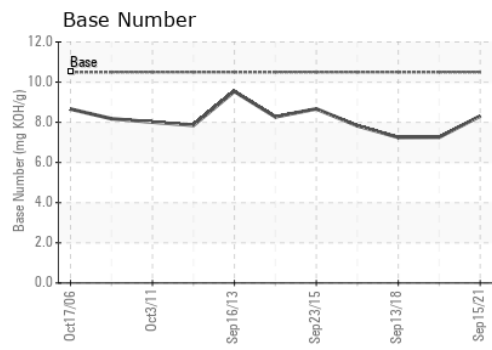
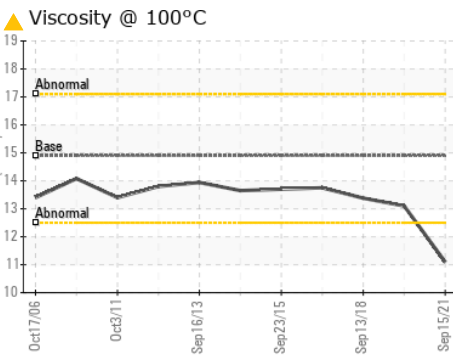
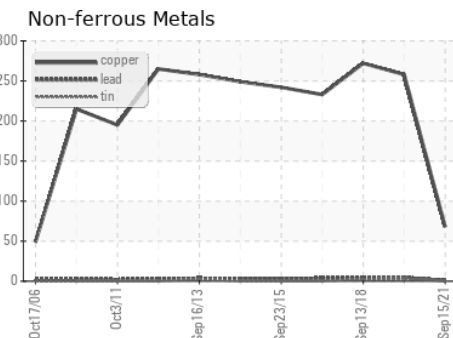
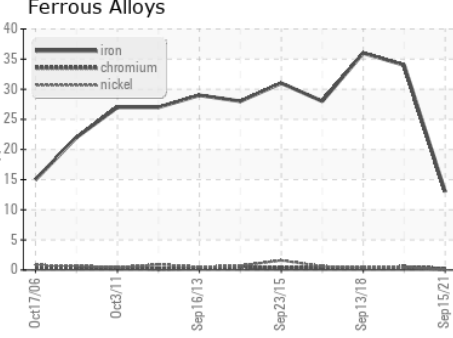
OIL ANALYSIS REPORT



VISUAL	method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual	NONE	NONE	NONE
Appearance	scalar	*Visual	NORML	NORML	NORML
Odor	scalar	*Visual	NORML	NORML	NORML
Emulsified Water	scalar	*Visual	>0.2	NEG	NEG
Free Water	scalar	*Visual		NEG	NEG

FLUID PROPERTIES	method	limit/base	current	history1	history2
Visc @ 100°C	cSt	ASTM D445	14.9	▲ 11.1	13.1

GRAPHS



Laboratory : WearCheck USA - 501 Madison Ave., Cary, NC 27513
Sample No. : RP181808 **Received** : 20 Sep 2021
Lab Number : 05354166 **Diagnosed** : 22 Sep 2021
Unique Number : 9668259 **Diagnostician** : Jonathan Hester
Test Package : IND 2 (Additional Tests: FT-IR, FuelDilution, KV100, PercentFuel, TBN)

GRAYLING GENERATING STATION
 4400 WEST FOUR MILE ROAD
 GRAYLING, MI
 US 49738
 Contact: JASON SHEA
 jason.j.shea@cmsenergy.com

To discuss this sample report, contact Customer Service at 1-800-237-1369.
 * - Denotes test methods that are outside of the ISO 17025 scope of accreditation.
 Statements of conformity to specifications are based on the simple acceptance decision rule (JCGM 106:2012) T: (989)348-4679