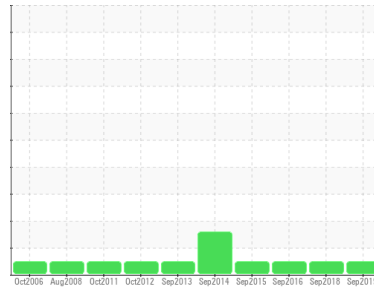




OIL ANALYSIS REPORT

Sample Rating Trend



NORMAL



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

DIAGNOSIS

Recommendation

Resample at the next service interval to monitor.

Wear

All component wear rates are normal.

Contamination

There is no indication of any contamination in the oil.

Fluid Condition

The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.

SAMPLE INFORMATION

	method	limit/base	current	history1	history2
Sample Number	Client Info		RP181795	RP145269	RP04068109
Sample Date	Client Info		09 Sep 2019	13 Sep 2018	20 Sep 2016
Machine Age	hrs	Client Info	768	740	704
Oil Age	hrs	Client Info	323	295	259
Oil Changed	Client Info		Not Chngd	Not Chngd	Not Chngd
Sample Status			NORMAL	NORMAL	NORMAL

CONTAMINATION

	method	limit/base	current	history1	history2
Fuel	WC Method	>5	<1.0	<1.0	<1.0
Glycol	WC Method		NEG	NEG	NEG

WEAR METALS

	method	limit/base	current	history1	history2
Iron	ppm	ASTM D5185m >100	34	36	28
Chromium	ppm	ASTM D5185m >20	<1	<1	<1
Nickel	ppm	ASTM D5185m >2	<1	<1	<1
Titanium	ppm	ASTM D5185m >2	0	0	<1
Silver	ppm	ASTM D5185m >2	0	0	0
Aluminum	ppm	ASTM D5185m >25	3	3	3
Lead	ppm	ASTM D5185m >40	4	4	4
Copper	ppm	ASTM D5185m >330	258	272	233
Tin	ppm	ASTM D5185m >15	3	3	0
Antimony	ppm	ASTM D5185m	0	0	<1
Vanadium	ppm	ASTM D5185m	0	0	0
Cadmium	ppm	ASTM D5185m	<1	0	0

ADDITIVES

	method	limit/base	current	history1	history2
Boron	ppm	ASTM D5185m 0	24	25	24
Barium	ppm	ASTM D5185m 0	0	0	0
Molybdenum	ppm	ASTM D5185m 100	84	88	78
Manganese	ppm	ASTM D5185m	<1	<1	<1
Magnesium	ppm	ASTM D5185m 60	130	139	125
Calcium	ppm	ASTM D5185m 3050	2933	3144	2853
Phosphorus	ppm	ASTM D5185m 1050	971	1064	935
Zinc	ppm	ASTM D5185m 1200	1154	1243	1188

CONTAMINANTS

	method	limit/base	current	history1	history2
Silicon	ppm	ASTM D5185m >25	6	4	5
Sodium	ppm	ASTM D5185m	6	7	6
Potassium	ppm	ASTM D5185m >20	2	3	1
Water	%	ASTM D6304 >0.2	0.102	---	---
ppm Water	ppm	ASTM D6304 >2000	1020	---	---

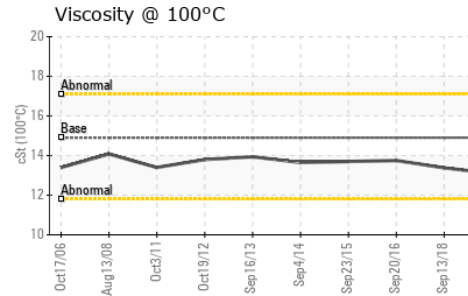
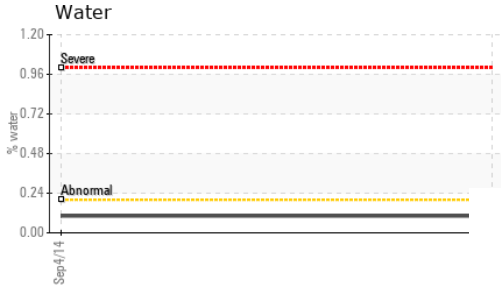
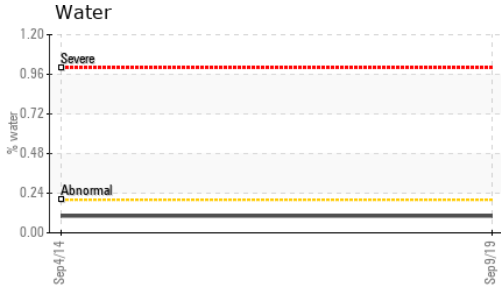
INFRA-RED

	method	limit/base	current	history1	history2
Soot %	%	*ASTM D7844 >3	0.2	0.3	0.1
Nitration	Abs/cm	*ASTM D7624 >20	12.1	11.7	10.
Sulfation	Abs/.1mm	*ASTM D7415 >30	31.8	31.3	28.

FLUID DEGRADATION

	method	limit/base	current	history1	history2
Oxidation	Abs/.1mm	*ASTM D7414 >25	23.2	23.4	19.
Base Number (BN)	mg KOH/g	ASTM D2896 10.5	7.26	7.25	7.83

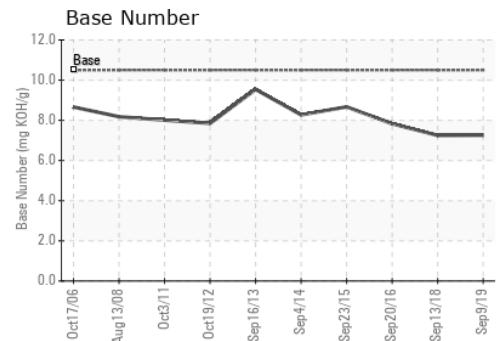
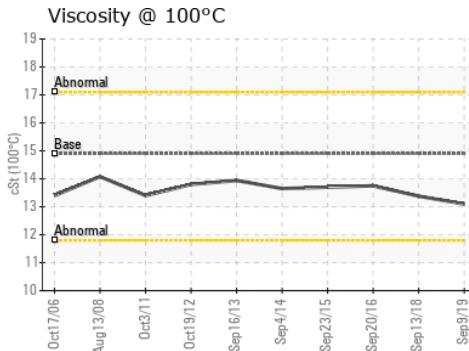
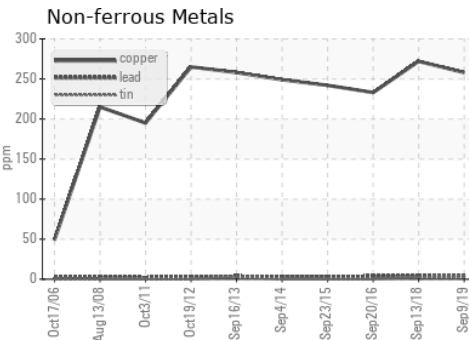
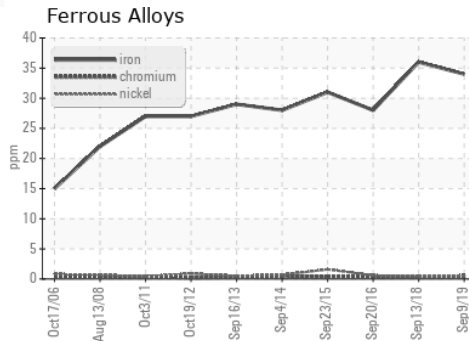
OIL ANALYSIS REPORT



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	13.1	13.38

GRAPHS



Certificate L2367

Laboratory : WearCheck USA - 501 Madison Ave., Cary, NC 27513
Sample No. : RP181795 **Received** : 26 Sep 2019
Lab Number : 04808033 **Diagnosed** : 27 Sep 2019
Unique Number : 8752904 **Diagnostician** : Don Baldrige
Test Package : IND 2 (Additional Tests: FT-IR, KV100, 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:
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