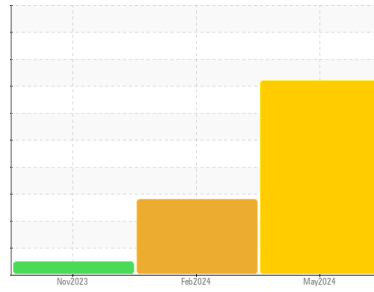


OIL ANALYSIS REPORT

Sample Rating Trend



Machine Id
501
Component
Diesel Engine
Fluid
RED GIANT LOCOMOTIVE EO 20W40 (--- GAL)

DIAGNOSIS

Recommendation

We advise that you check for the source of the coolant leak. Check for low coolant level. We advise that you check the air filter, air induction system, and any areas where dirt may enter the component. We recommend that you drain the oil and perform a filter service on this component if not already done. We recommend an early resample to monitor this condition.

Wear

All component wear rates are normal.

Contamination

Sodium and/or potassium levels are high. Elemental level of silicon (Si) above normal indicating ingress of seal material.

Fluid Condition

The BN result indicates that there is suitable alkalinity remaining in the oil. The oil is no longer serviceable due to the presence of contaminants.

SAMPLE INFORMATION

	method	limit/base	current	history1	history2
Sample Number	Client Info		PCA0092786	PCA0092727	PCA0092733
Sample Date	Client Info		20 May 2024	19 Feb 2024	20 Nov 2023
Machine Age	hrs	Client Info	0	0	0
Oil Age	hrs	Client Info	0	0	0
Oil Changed	Client Info		N/A	N/A	N/A
Sample Status			SEVERE	ABNORMAL	NORMAL

CONTAMINATION

	method	limit/base	current	history1	history2
Fuel	WC Method	>4	<1.0	<1.0	<1.0
Water	WC Method	>0.20	NEG	NEG	NEG

WEAR METALS

	method	limit/base	current	history1	history2
Iron	ppm	ASTM D5185m >100	46	39	26
Chromium	ppm	ASTM D5185m >15	2	2	2
Nickel	ppm	ASTM D5185m >5	1	<1	<1
Titanium	ppm	ASTM D5185m	<1	0	0
Silver	ppm	ASTM D5185m >2	1	0	0
Aluminum	ppm	ASTM D5185m >10	2	2	2
Lead	ppm	ASTM D5185m >75	7	5	3
Copper	ppm	ASTM D5185m >90	27	23	23
Tin	ppm	ASTM D5185m >30	8	9	8
Vanadium	ppm	ASTM D5185m	<1	0	0
Cadmium	ppm	ASTM D5185m	<1	0	0

ADDITIVES

	method	limit/base	current	history1	history2
Boron	ppm	ASTM D5185m	249	124	35
Barium	ppm	ASTM D5185m	<1	0	0
Molybdenum	ppm	ASTM D5185m	43	44	42
Manganese	ppm	ASTM D5185m	1	<1	<1
Magnesium	ppm	ASTM D5185m	11	13	12
Calcium	ppm	ASTM D5185m	2830	3326	3441
Phosphorus	ppm	ASTM D5185m 0	11	9	14
Zinc	ppm	ASTM D5185m 0	6	0	0
Sulfur	ppm	ASTM D5185m 1900	2689	2911	2876

CONTAMINANTS

	method	limit/base	current	history1	history2
Silicon	ppm	ASTM D5185m >17	▲ 138	▲ 36	5
Sodium	ppm	ASTM D5185m	▲ 1356	▲ 521	5
Potassium	ppm	ASTM D5185m >20	▲ 24	9	0
Glycol	%	*ASTM D2982	NEG	NEG	NEG

INFRA-RED

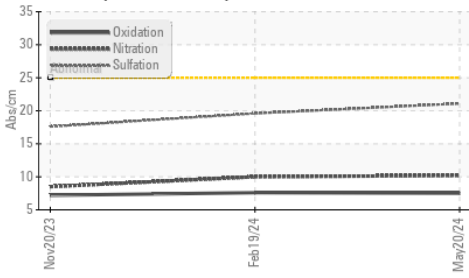
	method	limit/base	current	history1	history2
Soot %	%	*ASTM D7844 >3	2.4	2.2	2.1
Nitration	Abs/cm	*ASTM D7624 >20	10.2	10.0	8.5
Sulfation	Abs/.1mm	*ASTM D7415 >30	21.1	19.6	17.6

FLUID DEGRADATION

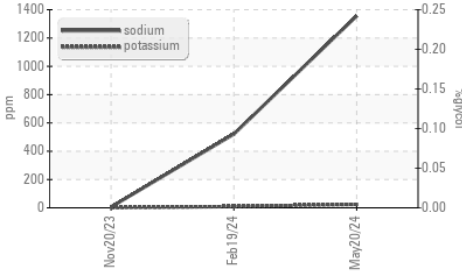
	method	limit/base	current	history1	history2
Oxidation	Abs/.1mm	*ASTM D7414 >25	7.5	7.6	7.2
Base Number (BN)	mg KOH/g	ASTM D2896 11	12.46	10.99	10.73

OIL ANALYSIS REPORT

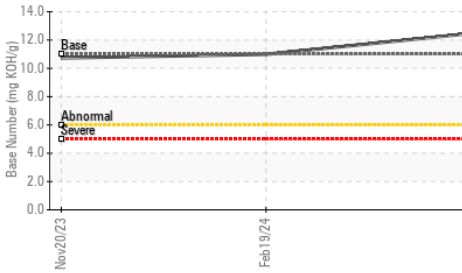
FT-IR (Direct Trend)



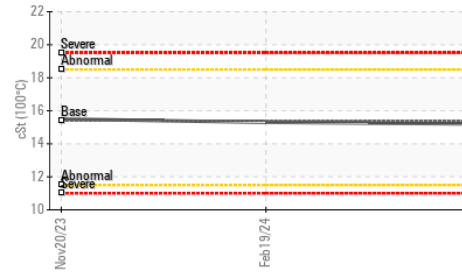
Glycol Contamination



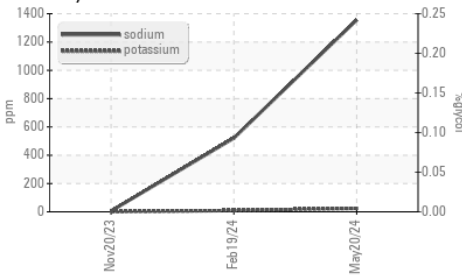
Base Number



Viscosity @ 100°C



Glycol Contamination

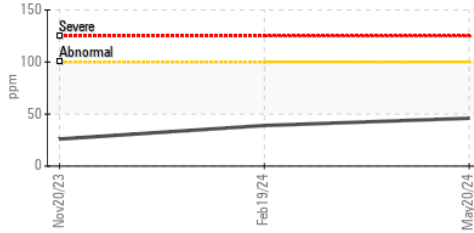


VISUAL	method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual	NONE	NONE	NONE
Appearance	scalar	*Visual	NORML	NORML	NORML
Odor	scalar	*Visual	NORML	NORML	NORML
Emulsified Water	scalar	*Visual	>0.20	NEG	NEG
Free Water	scalar	*Visual		NEG	NEG

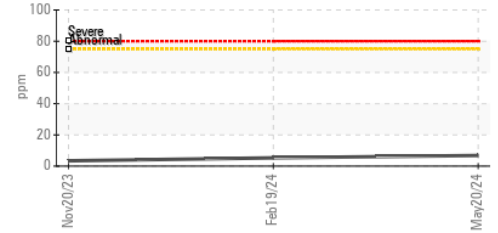
FLUID PROPERTIES	method	limit/base	current	history1	history2
Visc @ 100°C	cSt	ASTM D445	15.4	15.2	15.3

GRAPHS

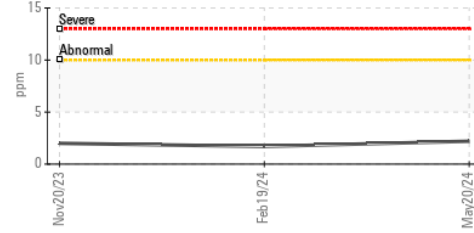
Iron (ppm)



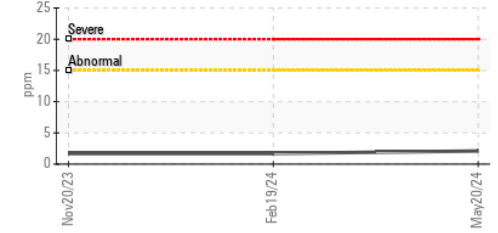
Lead (ppm)



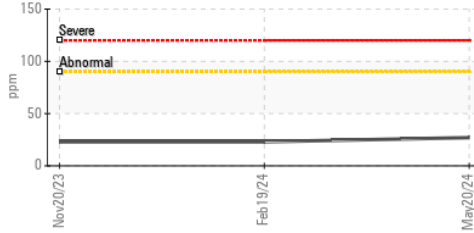
Aluminum (ppm)



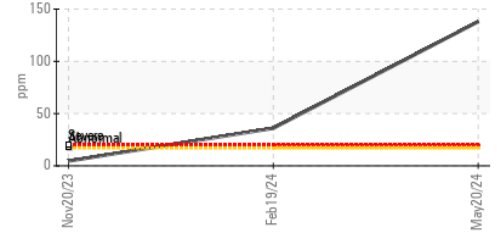
Chromium (ppm)



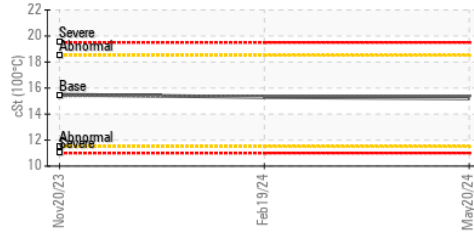
Copper (ppm)



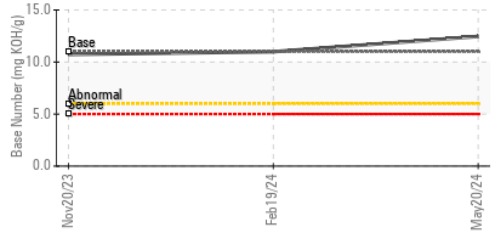
▲ Silicon (ppm)



Viscosity @ 100°C



Base Number



Certificate L2367

Laboratory : WearCheck USA - 501 Madison Ave., Cary, NC 27513
Sample No. : PCA0092786 **Received** : 28 May 2024
Lab Number : 06193024 **Tested** : 31 May 2024
Unique Number : 11049776 **Diagnosed** : 31 May 2024 - Jonathan Hester
Test Package : MOB 2 (Additional Tests: Glycol)

U.S. SUGAR CORP
 1731 S W.C. OWEN AVENUE
 CLEWISTON, FL
 US 33440-3032
 Contact: JAMES MCGROGAN
 jmcgrogan@ussugar.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)