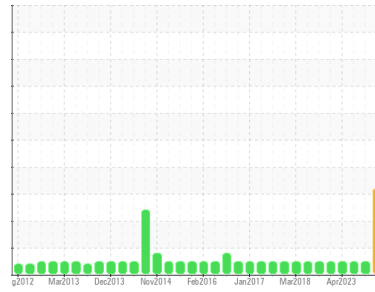


OIL ANALYSIS REPORT

Sample Rating Trend



Machine Id
WESTERN STAR 20 - CAT
 Component
Diesel Engine
 Fluid
FLEETLINE SUPERFLEET XHD 15W40 (10 GAL)

DIAGNOSIS

Recommendation

We advise that you check the air filter, air induction system, and any areas where dirt may enter the component. Oil and filter change at the time of sampling has been noted. Resample at the next service interval to monitor.

Wear

Cylinder, crank, or cam shaft wear is indicated.

Contamination

Elemental levels of silicon (Si) and aluminum (Al) indicate alumina-silicate (coarse dirt) ingress.

Fluid Condition

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

SAMPLE INFORMATION		method	limit/base	current	history1	history2
Sample Number	Client Info			PCA0109962	LP0000859	LP0000495
Sample Date	Client Info			11 May 2024	01 Dec 2023	21 Aug 2023
Machine Age	mls	Client Info		699951	683381	673432
Oil Age	mls	Client Info		0	9240	12347
Oil Changed	Client Info			Changed	Changed	Changed
Sample Status				ABNORMAL	NORMAL	NORMAL

CONTAMINATION		method	limit/base	current	history1	history2
Fuel	WC Method	>5		<1.0	<1.0	<1.0
Water	WC Method	>0.2		NEG	NEG	NEG
Glycol	WC Method			NEG	NEG	NEG

WEAR METALS		method	limit/base	current	history1	history2
Iron	ppm	ASTM D5185m	>100	▲ 196	52	60
Chromium	ppm	ASTM D5185m	>20	11	2	2
Nickel	ppm	ASTM D5185m	>2	2	<1	<1
Titanium	ppm	ASTM D5185m	>2	1	<1	<1
Silver	ppm	ASTM D5185m	>2	<1	0	0
Aluminum	ppm	ASTM D5185m	>25	● 13	3	3
Lead	ppm	ASTM D5185m	>40	2	2	5
Copper	ppm	ASTM D5185m	>330	9	5	6
Tin	ppm	ASTM D5185m	>15	1	<1	<1
Vanadium	ppm	ASTM D5185m		<1	0	<1
Cadmium	ppm	ASTM D5185m		0	0	0

ADDITIVES		method	limit/base	current	history1	history2
Boron	ppm	ASTM D5185m		3	14	13
Barium	ppm	ASTM D5185m		0	0	0
Molybdenum	ppm	ASTM D5185m		25	59	73
Manganese	ppm	ASTM D5185m		3	<1	<1
Magnesium	ppm	ASTM D5185m		139	735	634
Calcium	ppm	ASTM D5185m		2279	1206	1670
Phosphorus	ppm	ASTM D5185m		862	972	1105
Zinc	ppm	ASTM D5185m		1030	1167	1359
Sulfur	ppm	ASTM D5185m		3811	2974	4249

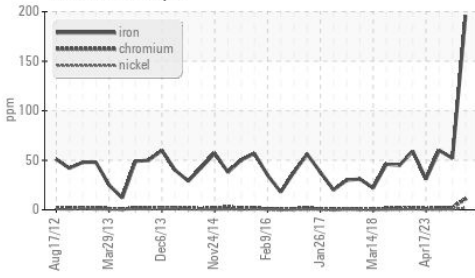
CONTAMINANTS		method	limit/base	current	history1	history2
Silicon	ppm	ASTM D5185m	>25	▲ 50	9	12
Sodium	ppm	ASTM D5185m		6	2	3
Potassium	ppm	ASTM D5185m	>20	3	2	3

INFRA-RED		method	limit/base	current	history1	history2
Soot %	%	*ASTM D7844	>3	0.5	0.5	0.7
Nitration	Abs/cm	*ASTM D7624	>20	10.3	10.3	10.6
Sulfation	Abs/.1mm	*ASTM D7415	>30	21.9	22.2	22.8

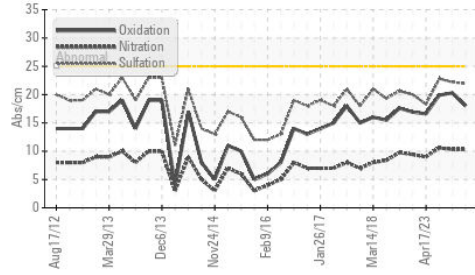
FLUID DEGRADATION		method	limit/base	current	history1	history2
Oxidation	Abs/.1mm	*ASTM D7414	>25	18.0	20.3	19.9
Base Number (BN)	mg KOH/g	ASTM D2896		6.78	9.04	7.45

OIL ANALYSIS REPORT

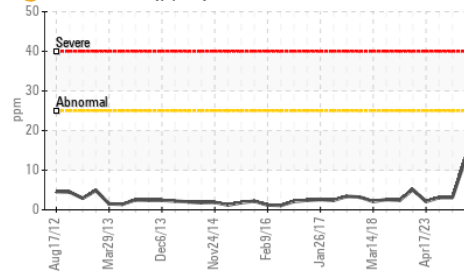
▲ Ferrous Alloys



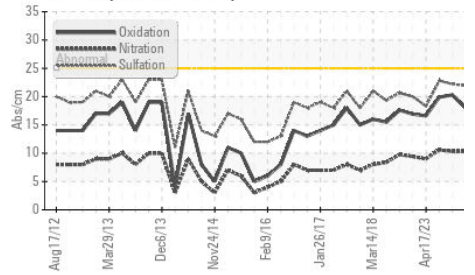
● FT-IR (Direct Trend)



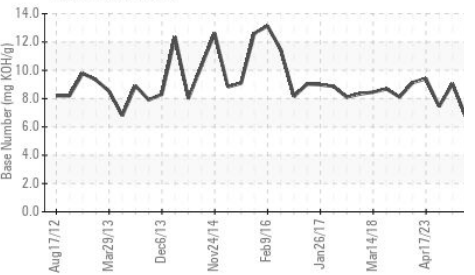
● Aluminum (ppm)



● FT-IR (Direct Trend)



Base Number

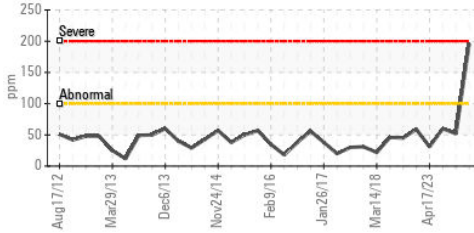


VISUAL	method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual	NONE	NONE	NONE
Appearance	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

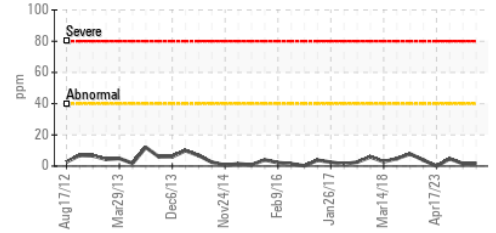
FLUID PROPERTIES	method	limit/base	current	history1	history2
Visc @ 100°C	cSt	ASTM D445	15.6	12.9	13.0

GRAPHS

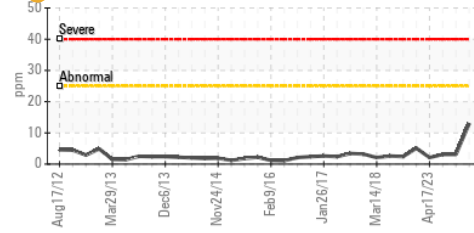
▲ Iron (ppm)



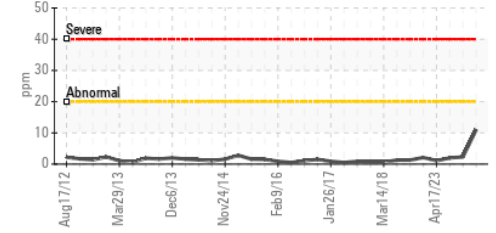
▲ Lead (ppm)



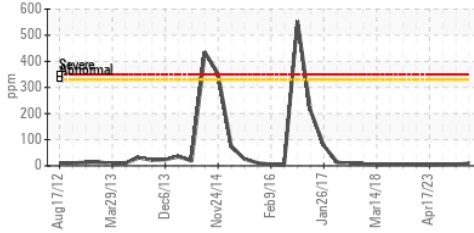
● Aluminum (ppm)



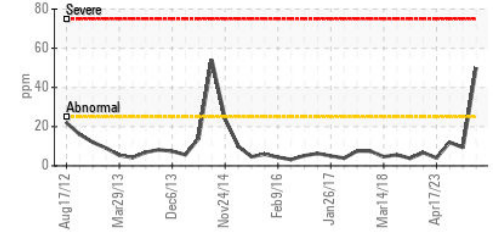
▲ Chromium (ppm)



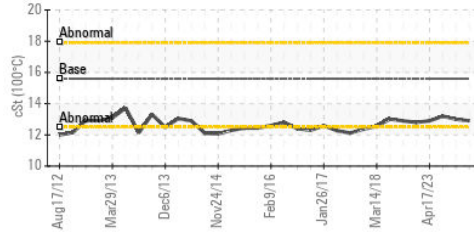
● Copper (ppm)



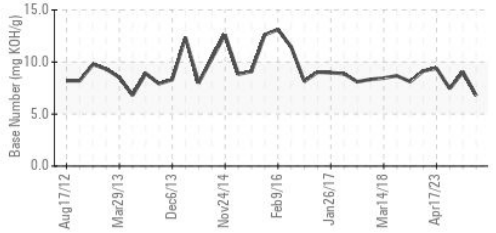
▲ Silicon (ppm)



Viscosity @ 100°C



Base Number



Certificate L2367

Laboratory : WearCheck USA - 501 Madison Ave., Cary, NC 27513

Sample No. : PCA0109962

Lab Number : 06188256

Unique Number : 11045008

Test Package : MOB 2

Received : 22 May 2024

Tested : 24 May 2024

Diagnosed : 24 May 2024 - Sean Felton

S.M. LORUSSO & SONS

221 NORFOLK ST.

WALPOLE, MA

US 02081

Contact: PAUL BECKMAN

pbeckman@smlorusso.com

T: (508)668-2603

F: (508)660-0232

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)