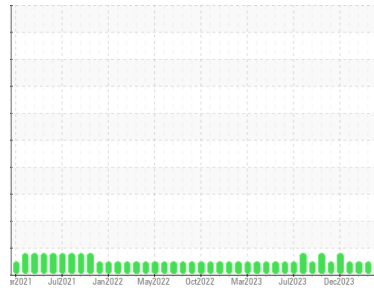




OIL ANALYSIS REPORT

Sample Rating Trend



NORMAL



Area

Louisville

Machine Id

[Louisville] Oil - Starboard Main Engine

Component

Starboard Main Engine

Fluid

DIESEL ENGINE OIL SAE 15W40 (150 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		WC0874760	WC0804848	WC0859855
Sample Date	Client Info		28 Apr 2024	30 Jan 2024	29 Dec 2023
Machine Age	hrs	Client Info	950	39416	0
Oil Age	hrs	Client Info	950	9751	0
Oil Changed	Client Info		N/A	N/A	N/A
Sample Status			NORMAL	NORMAL	NORMAL

CONTAMINATION

	method	limit/base	current	history1	history2
Fuel	WC Method	>4.0	<1.0	<1.0	<1.0
Glycol	WC Method		NEG	NEG	NEG

WEAR METALS

	method	limit/base	current	history1	history2
Iron	ppm	ASTM D5185m >75	8	9	8
Chromium	ppm	ASTM D5185m >8	<1	<1	<1
Nickel	ppm	ASTM D5185m >2	<1	0	<1
Titanium	ppm	ASTM D5185m >3	1	<1	<1
Silver	ppm	ASTM D5185m >2	<1	0	<1
Aluminum	ppm	ASTM D5185m >15	2	1	2
Lead	ppm	ASTM D5185m >18	1	6	7
Copper	ppm	ASTM D5185m >80	6	75	76
Tin	ppm	ASTM D5185m >14	1	<1	2
Vanadium	ppm	ASTM D5185m	<1	0	<1
Cadmium	ppm	ASTM D5185m	<1	0	<1

ADDITIVES

	method	limit/base	current	history1	history2
Boron	ppm	ASTM D5185m 250	24	10	12
Barium	ppm	ASTM D5185m 10	<1	0	0
Molybdenum	ppm	ASTM D5185m 100	59	62	62
Manganese	ppm	ASTM D5185m	<1	<1	2
Magnesium	ppm	ASTM D5185m 450	1363	1519	1380
Calcium	ppm	ASTM D5185m 3000	1146	1163	1059
Phosphorus	ppm	ASTM D5185m 1150	997	1064	977
Zinc	ppm	ASTM D5185m 1350	1182	1293	1202
Sulfur	ppm	ASTM D5185m 4250	3252	2513	2270

CONTAMINANTS

	method	limit/base	current	history1	history2
Silicon	ppm	ASTM D5185m >20	4	3	5
Sodium	ppm	ASTM D5185m >158	3	7	9
Potassium	ppm	ASTM D5185m >20	3	0	4
Water	%	ASTM D6304 >0.1	NEG	NEG	NEG

INFRA-RED

	method	limit/base	current	history1	history2
Soot %	%	*ASTM D7844	0.1	0.1	0.1
Nitration	Abs/cm	*ASTM D7624 >20	7.8	12.4	11.8
Sulfation	Abs/.1mm	*ASTM D7415 >30	19.2	24.0	23.3

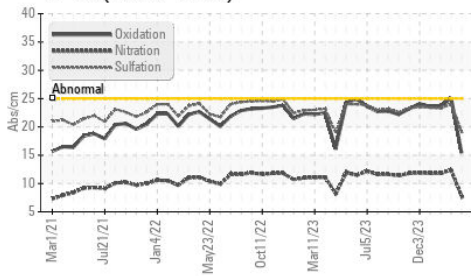
FLUID DEGRADATION

	method	limit/base	current	history1	history2
Oxidation	Abs/.1mm	*ASTM D7414 >25	15.4	25.1	23.6
Base Number (BN)	mg KOH/g	ASTM D2896 8.5	12.28	9.32	9.09

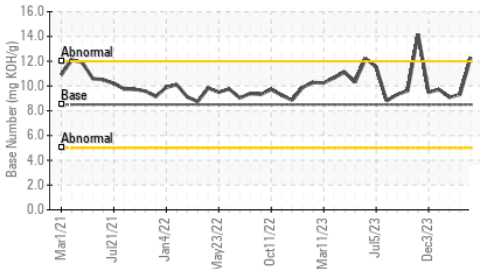


OIL ANALYSIS REPORT

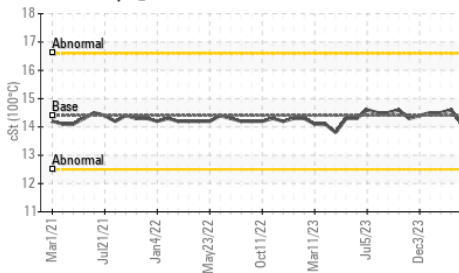
FT-IR (Direct Trend)



Base Number



Viscosity @ 100°C

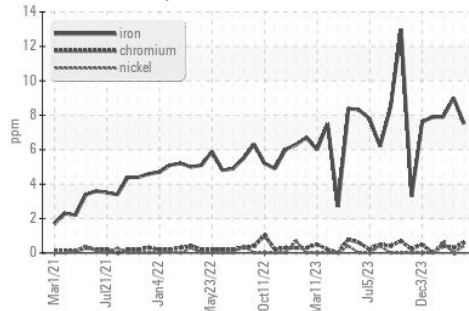


VISUAL	method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual	NONE	NONE	NONE
Appearance	scalar	*Visual	NORML	NORML	NORML
Odor	scalar	*Visual	NORML	NORML	NORML
Emulsified Water	scalar	*Visual	>0.1	NEG	NEG
Free Water	scalar	*Visual		NEG	NEG

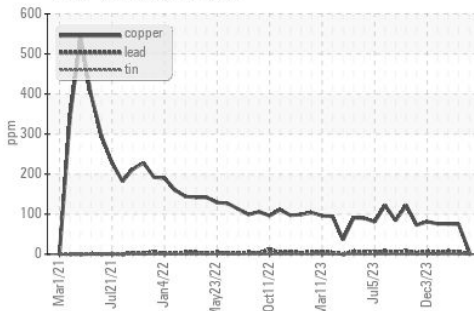
FLUID PROPERTIES	method	limit/base	current	history1	history2
Visc @ 100°C	cSt	ASTM D445	14.4	14.1	14.6

GRAPHS

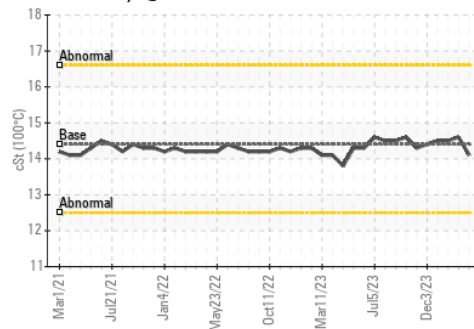
Ferrous Alloys



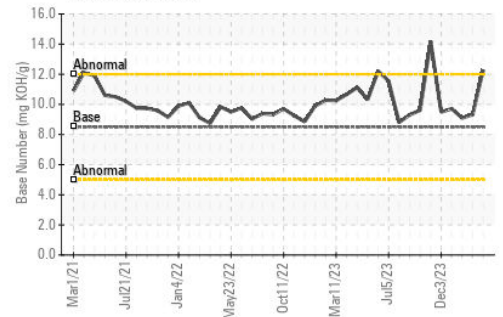
Non-ferrous Metals



Viscosity @ 100°C



Base Number



Certificate L2367

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

Sample No. : WC0874760

Lab Number : 06181566

Unique Number : 11032892

Test Package : IND 2 (Additional Tests: KF)

Received : 16 May 2024

Tested : 20 May 2024

Diagnosed : 20 May 2024 - Sean Felton

MARATHON PETROLEUM CO.

101 12TH ST

CATLETTSBURG, KY

US 41169

Contact: CORY GUMBERT

cagumbert@marathonpetroleum.com

T: (606)585-3950

F: x:

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)