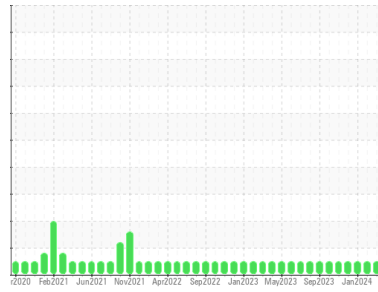




OIL ANALYSIS REPORT

Sample Rating Trend



NORMAL



Area

Nashville

Machine Id

[Nashville] Oil - Starboard Main Engine

Component

Starboard Main Engine

Fluid

MOBIL 15W40 (210 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		WC0874900	WC0846029	WC0846032
Sample Date	Client Info		18 Mar 2024	20 Feb 2024	22 Jan 2024
Machine Age	hrs	Client Info	59051	58512	57894
Oil Age	hrs	Client Info	2363	1825	1207
Oil Changed	Client Info		Not Chngd	Filtered	Filtered
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	6	6	5
Chromium	ppm	ASTM D5185m	>8	<1	<1	<1
Nickel	ppm	ASTM D5185m	>2	0	0	<1
Titanium	ppm	ASTM D5185m	>3	0	<1	<1
Silver	ppm	ASTM D5185m	>2	0	0	<1
Aluminum	ppm	ASTM D5185m	>15	1	1	2
Lead	ppm	ASTM D5185m	>18	0	0	3
Copper	ppm	ASTM D5185m	>80	0	4	9
Tin	ppm	ASTM D5185m	>14	<1	0	1
Vanadium	ppm	ASTM D5185m		0	0	<1
Cadmium	ppm	ASTM D5185m		0	0	<1

ADDITIVES

	method	limit/base	current	history1	history2	
Boron	ppm	ASTM D5185m		50	51	59
Barium	ppm	ASTM D5185m		0	0	0
Molybdenum	ppm	ASTM D5185m		47	44	42
Manganese	ppm	ASTM D5185m		<1	<1	2
Magnesium	ppm	ASTM D5185m		1062	1056	936
Calcium	ppm	ASTM D5185m		1587	1671	1492
Phosphorus	ppm	ASTM D5185m		1049	980	981
Zinc	ppm	ASTM D5185m		1296	1276	1227
Sulfur	ppm	ASTM D5185m		3749	3354	3155

CONTAMINANTS

	method	limit/base	current	history1	history2	
Silicon	ppm	ASTM D5185m	>20	2	2	4
Sodium	ppm	ASTM D5185m	>118	3	2	4
Potassium	ppm	ASTM D5185m	>20	3	2	7
Water	%	ASTM D6304	>0.1	NEG	NEG	NEG

INFRA-RED

	method	limit/base	current	history1	history2	
Soot %	%	*ASTM D7844		1.3	1.2	0.9
Nitration	Abs/cm	*ASTM D7624	>20	9.3	8.7	7.9
Sulfation	Abs/.1mm	*ASTM D7415	>30	22.8	21.9	21.3

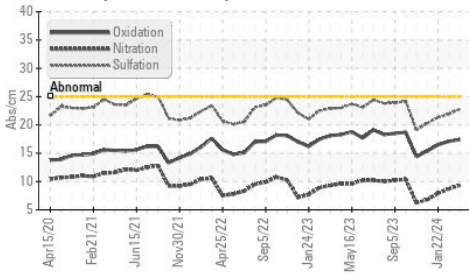
FLUID DEGRADATION

	method	limit/base	current	history1	history2	
Oxidation	Abs/.1mm	*ASTM D7414	>25	17.4	17.1	16.5
Base Number (BN)	mg KOH/g	ASTM D2896		11.96	12.23	11.66



OIL ANALYSIS REPORT

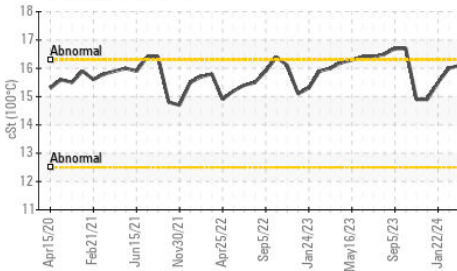
FT-IR (Direct Trend)



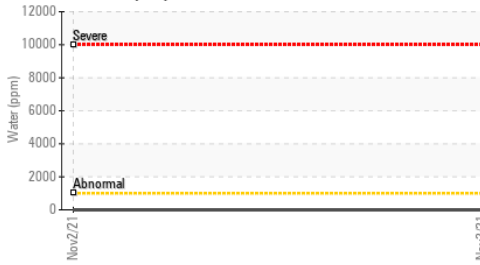
Water (KF)



Viscosity @ 100°C



Water (KF)

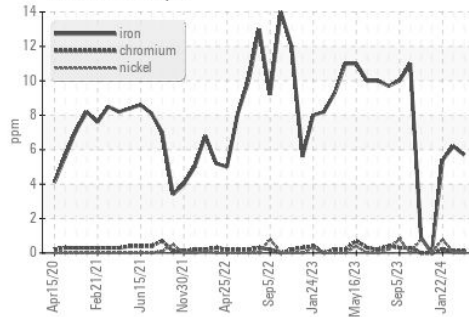


VISUAL	method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual	NONE	NONE	NONE
Appearance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

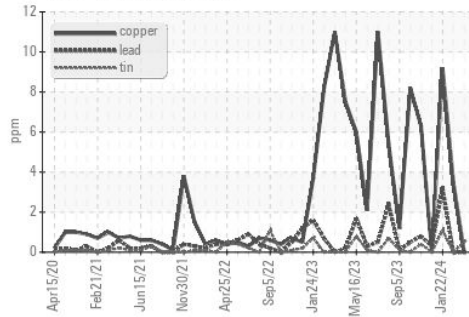
FLUID PROPERTIES	method	limit/base	current	history1	history2
Visc @ 100°C	cSt	ASTM D445	16.1	16.0	15.5

GRAPHS

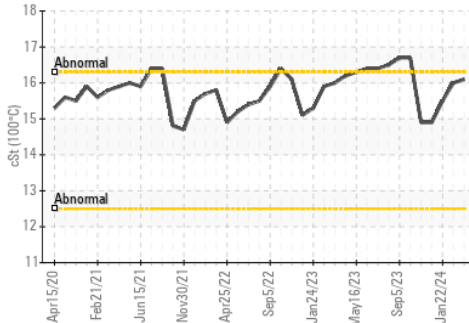
Ferrous Alloys



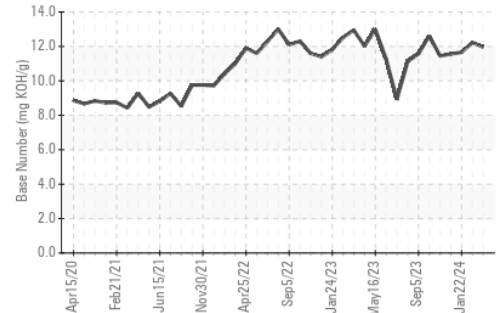
Non-ferrous Metals



Viscosity @ 100°C



Base Number



Certificate L2367

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

Sample No. : WC0874900

Lab Number : 06157873

Unique Number : 10993296

Test Package : IND 2 (Additional Tests: KF)

Received : 23 Apr 2024

Tested : 25 Apr 2024

Diagnosed : 25 Apr 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)