



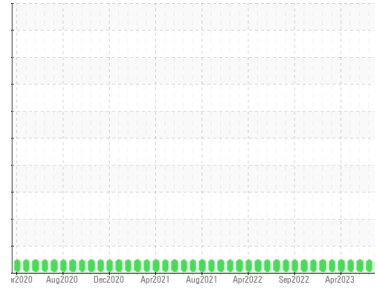
PROBLEM SUMMARY

Sample Rating Trend

WEAR

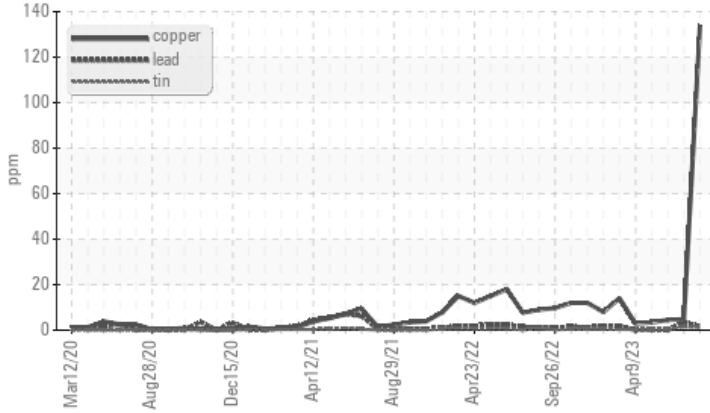


Area
Marathon
 Machine Id
[Marathon] Oil - Starboard Main Engine
 Component
Starboard Main Engine
 Fluid
DIESEL ENGINE OIL SAE 15W40 (150 GAL)



COMPONENT CONDITION SUMMARY

▲ Non-ferrous Metals



RECOMMENDATION

No corrective action is recommended at this time.
 Resample at the next service interval to monitor.

PROBLEMATIC TEST RESULTS

Sample Status				ABNORMAL	NORMAL	NORMAL
Copper	ppm	ASTM D5185m	>80	▲ 134	5	4

Customer Id: MARCAT
Sample No.: WC0769278
Lab Number: 05967934
Test Package: IND 2



To manage this report scan the QR code

To discuss the diagnosis or test data:
 Don Baldrige +1
don.b505@comcast.net

To change component or sample information:
 Customer Service +1 1-800-237-1369
customerservice@wearcheck.com

RECOMMENDED ACTIONS

There are no recommended actions for this sample.

HISTORICAL DIAGNOSIS

27 Aug 2023 Diag: Doug Bogart

NORMAL



Oil and filter change at the time of sampling has been noted. Resample at the next service interval to monitor. All component wear rates are normal. Fuel content negligible. There is no indication of any contamination in the oil. The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.

view report



27 Jun 2023 Diag: Sean Felton

NORMAL



Resample at the next service interval to monitor. All component wear rates are normal. There is no indication of any contamination in the oil. The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.

view report



07 May 2023 Diag: Jonathan Hester

NORMAL



Resample at the next service interval to monitor. All component wear rates are normal. There is no indication of any contamination in the oil. The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.

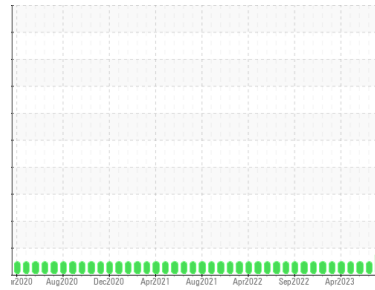
view report





OIL ANALYSIS REPORT

Sample Rating Trend



WEAR



Area
Marathon
 Machine Id
[Marathon] Oil - Starboard Main Engine
 Component
Starboard Main Engine
 Fluid
DIESEL ENGINE OIL SAE 15W40 (150 GAL)

DIAGNOSIS

▲ Recommendation

No corrective action is recommended at this time. Resample at the next service interval to monitor.

▲ Wear

The copper level is abnormal. Elemental level of copper (Cu) probably due to leaching of copper from copper components (i.e. cooling core) by the oil additives. All other 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		WC0769278	WC0769294	WC0769290
Sample Date	Client Info		25 Sep 2023	27 Aug 2023	27 Jun 2023
Machine Age	hrs	Client Info	3367	2866	1822
Oil Age	hrs	Client Info	3367	2866	999
Oil Changed	Client Info		N/A	Filtered	Filtered
Sample Status			ABNORMAL	NORMAL	NORMAL

CONTAMINATION

	method	limit/base	current	history1	history2
Fuel	WC Method	>4.0	<1.0	0.5	<1.0
Glycol	WC Method		NEG	NEG	NEG

WEAR METALS

	method	limit/base	current	history1	history2
Iron	ppm	ASTM D5185m >75	10	24	6
Chromium	ppm	ASTM D5185m >8	<1	<1	<1
Nickel	ppm	ASTM D5185m >2	0	0	0
Titanium	ppm	ASTM D5185m >3	<1	2	1
Silver	ppm	ASTM D5185m >2	0	0	0
Aluminum	ppm	ASTM D5185m >15	1	3	<1
Lead	ppm	ASTM D5185m >18	2	3	0
Copper	ppm	ASTM D5185m >80	▲ 134	5	4
Tin	ppm	ASTM D5185m >14	1	1	<1
Vanadium	ppm	ASTM D5185m	0	<1	0
Cadmium	ppm	ASTM D5185m	0	<1	0

ADDITIVES

	method	limit/base	current	history1	history2
Boron	ppm	ASTM D5185m 250	116	216	135
Barium	ppm	ASTM D5185m 10	0	0	0
Molybdenum	ppm	ASTM D5185m 100	67	107	47
Manganese	ppm	ASTM D5185m	<1	1	<1
Magnesium	ppm	ASTM D5185m 450	682	821	633
Calcium	ppm	ASTM D5185m 3000	1668	2008	1764
Phosphorus	ppm	ASTM D5185m 1150	851	814	896
Zinc	ppm	ASTM D5185m 1350	1120	1019	1128
Sulfur	ppm	ASTM D5185m 4250	2776	3439	3527

CONTAMINANTS

	method	limit/base	current	history1	history2
Silicon	ppm	ASTM D5185m >20	3	5	3
Sodium	ppm	ASTM D5185m >158	2	12	3
Potassium	ppm	ASTM D5185m >20	3	<1	3

INFRA-RED

	method	limit/base	current	history1	history2
Soot %	%	*ASTM D7844	0.2	0.4	0.2
Nitration	Abs/cm	*ASTM D7624 >20	9.3	9.4	8.7
Sulfation	Abs/.1mm	*ASTM D7415 >30	22.1	24.3	21.9

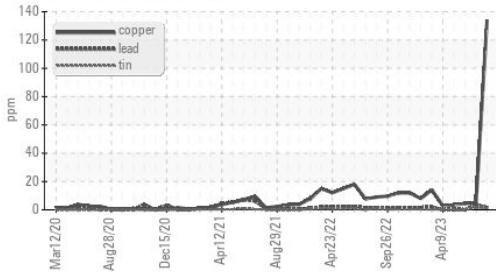
FLUID DEGRADATION

	method	limit/base	current	history1	history2
Oxidation	Abs/.1mm	*ASTM D7414 >25	19.2	19.7	17.6
Base Number (BN)	mg KOH/g	ASTM D2896 8.5	8.02	9.37	9.59



OIL ANALYSIS REPORT

▲ Non-ferrous Metals

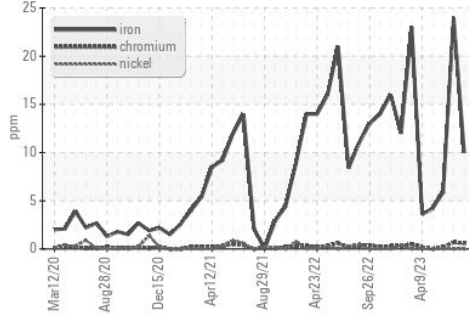


VISUAL	method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual	NONE	NONE	NONE
Appearance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

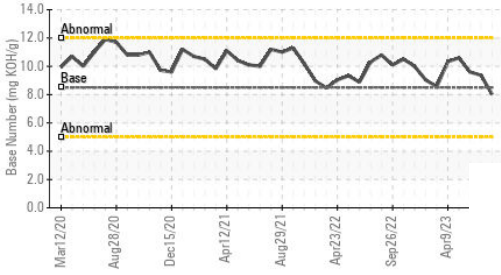
FLUID PROPERTIES	method	limit/base	current	history1	history2	
Visc @ 100°C	cSt	ASTM D445	14.4	14.2	12.4	14.2

GRAPHS

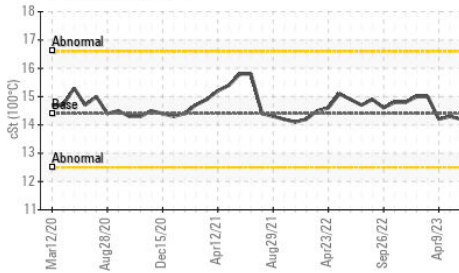
Ferrous Alloys



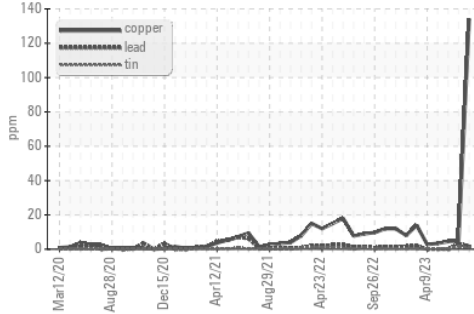
Base Number



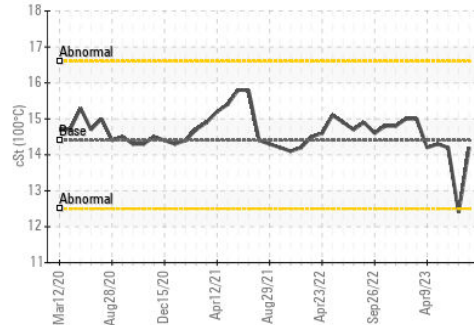
Viscosity @ 100°C



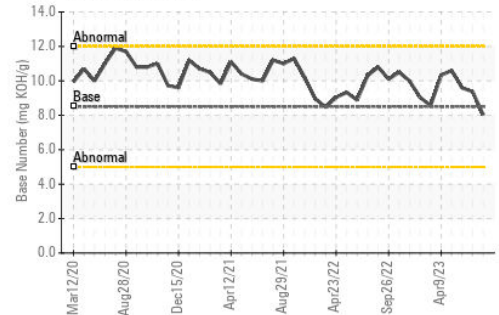
▲ Non-ferrous Metals



Viscosity @ 100°C



Base Number



Certificate L2367

Laboratory : WearCheck USA - 501 Madison Ave., Cary, NC 27513
Sample No. : WC0769278 **Received** : 03 Oct 2023
Lab Number : **05967934** **Diagnosed** : 05 Oct 2023
Unique Number : 10674485 **Diagnostician** : Don Baldrige
Test Package : IND 2

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)