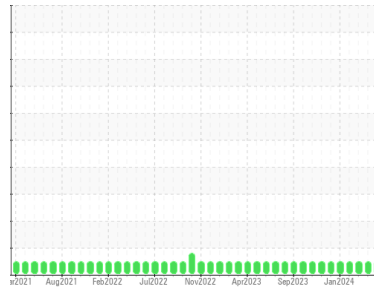




# OIL ANALYSIS REPORT

Sample Rating Trend



**NORMAL**



Area

**Ohio Valley**

Machine Id

**[Ohio Valley] 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. ( Customer Sample Comment: Dillinger )

### 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		<b>WC0719222</b>	WC0846017	WC0846057
Sample Date	Client Info		<b>11 May 2024</b>	11 Apr 2024	16 Mar 2024
Machine Age	hrs	Client Info	<b>64257</b>	63790	63276
Oil Age	hrs	Client Info	<b>9380</b>	8913	8400
Oil Changed	Client Info		<b>N/A</b>	Not Changd	N/A
Sample Status			<b>NORMAL</b>	NORMAL	NORMAL

## CONTAMINATION

	method	limit/base	current	history1	history2
Fuel	WC Method	>4.0	<b>&lt;1.0</b>	<1.0	<1.0
Water	WC Method	>0.1	<b>NEG</b>	NEG	NEG
Glycol	WC Method		<b>NEG</b>	NEG	NEG

## WEAR METALS

	method	limit/base	current	history1	history2
Iron	ppm	ASTM D5185m >75	<b>16</b>	12	17
Chromium	ppm	ASTM D5185m >8	<b>1</b>	<1	<1
Nickel	ppm	ASTM D5185m >2	<b>&lt;1</b>	0	<1
Titanium	ppm	ASTM D5185m >3	<b>&lt;1</b>	0	<1
Silver	ppm	ASTM D5185m >2	<b>&lt;1</b>	0	<1
Aluminum	ppm	ASTM D5185m >15	<b>3</b>	1	2
Lead	ppm	ASTM D5185m >18	<b>&lt;1</b>	0	1
Copper	ppm	ASTM D5185m >80	<b>1</b>	0	<1
Tin	ppm	ASTM D5185m >14	<b>1</b>	<1	<1
Vanadium	ppm	ASTM D5185m	<b>&lt;1</b>	0	<1
Cadmium	ppm	ASTM D5185m	<b>&lt;1</b>	0	<1

## ADDITIVES

	method	limit/base	current	history1	history2
Boron	ppm	ASTM D5185m 250	<b>38</b>	41	40
Barium	ppm	ASTM D5185m 10	<b>0</b>	0	0
Molybdenum	ppm	ASTM D5185m 100	<b>35</b>	32	34
Manganese	ppm	ASTM D5185m	<b>&lt;1</b>	<1	<1
Magnesium	ppm	ASTM D5185m 450	<b>1054</b>	1010	1033
Calcium	ppm	ASTM D5185m 3000	<b>1556</b>	1487	1581
Phosphorus	ppm	ASTM D5185m 1150	<b>953</b>	867	905
Zinc	ppm	ASTM D5185m 1350	<b>1068</b>	1015	1061
Sulfur	ppm	ASTM D5185m 4250	<b>3587</b>	3602	3414

## CONTAMINANTS

	method	limit/base	current	history1	history2
Silicon	ppm	ASTM D5185m >20	<b>4</b>	3	4
Sodium	ppm	ASTM D5185m >158	<b>2</b>	2	2
Potassium	ppm	ASTM D5185m >20	<b>4</b>	2	3

## INFRA-RED

	method	limit/base	current	history1	history2
Soot %	%	*ASTM D7844	<b>1.1</b>	2.7	3
Nitration	Abs/cm	*ASTM D7624 >20	<b>8.9</b>	11.1	11.2
Sulfation	Abs/.1mm	*ASTM D7415 >30	<b>21.5</b>	25.8	25.5

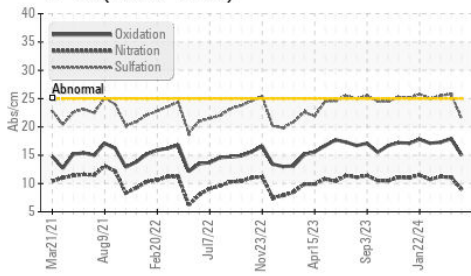
## FLUID DEGRADATION

	method	limit/base	current	history1	history2
Oxidation	Abs/.1mm	*ASTM D7414 >25	<b>15.0</b>	17.9	17.3
Base Number (BN)	mg KOH/g	ASTM D2896 8.5	<b>11.07</b>	10.83	11.23

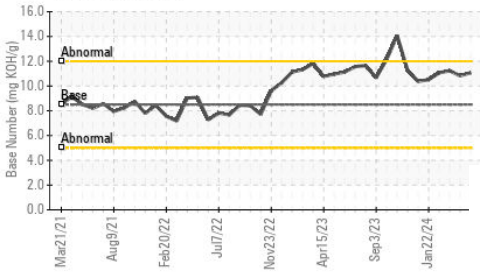


# OIL ANALYSIS REPORT

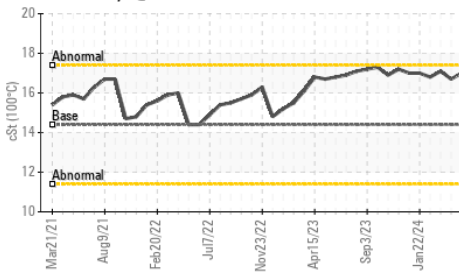
### FT-IR (Direct Trend)



### Base Number



### Viscosity @ 100°C

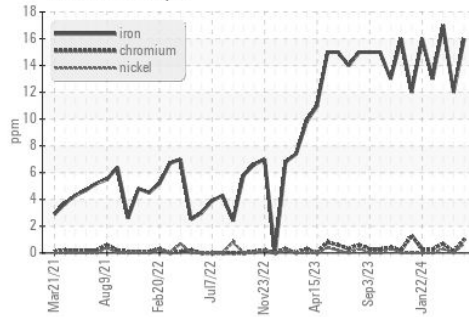


VISUAL	method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual	NONE	NONE	NONE
Appearance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

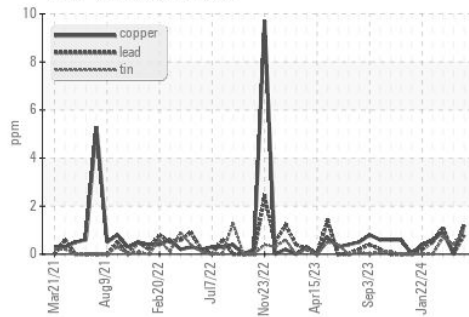
FLUID PROPERTIES	method	limit/base	current	history1	history2	
Visc @ 100°C	cSt	ASTM D445	14.4	17.0	16.7	17.1

### GRAPHS

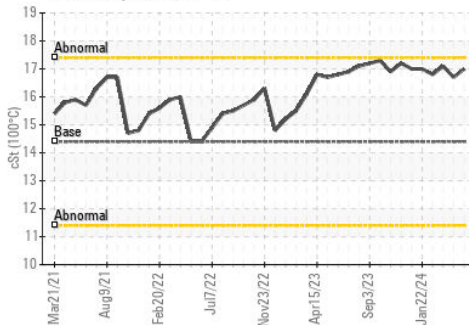
#### Ferrous Alloys



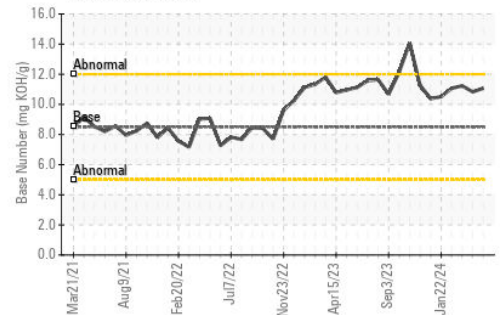
#### Non-ferrous Metals



#### Viscosity @ 100°C



#### Base Number



Certificate L2367

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

Sample No. : WC0719222

Lab Number : 06184535

Unique Number : 11035861

Test Package : IND 2

Received : 20 May 2024

Tested : 21 May 2024

Diagnosed : 22 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)