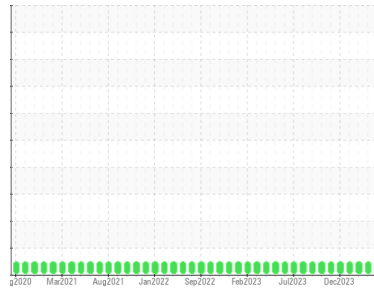




# OIL ANALYSIS REPORT

Sample Rating Trend



**NORMAL**



Area

**Kentucky**

Machine Id

**[Kentucky] Oil - Starboard Main Engine**

Component

**Starboard Main Engine**

Fluid

**DIESEL ENGINE OIL SAE 15W40 (216 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		<b>WC0874818</b>	WC0874821	WC0859931
Sample Date	Client Info		<b>25 Apr 2024</b>	16 Mar 2024	16 Feb 2024
Machine Age	hrs	Client Info	<b>14434</b>	13554	12937
Oil Age	hrs	Client Info	<b>896</b>	2010	1393
Oil Changed	Client Info		<b>Changed</b>	Oil Added	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
Glycol	WC Method		<b>NEG</b>	NEG	NEG

## WEAR METALS

	method	limit/base	current	history1	history2
Iron	ppm	ASTM D5185m >75	<b>18</b>	7	4
Chromium	ppm	ASTM D5185m >8	<b>&lt;1</b>	<1	0
Nickel	ppm	ASTM D5185m >2	<b>&lt;1</b>	<1	0
Titanium	ppm	ASTM D5185m >3	<b>&lt;1</b>	<1	0
Silver	ppm	ASTM D5185m >2	<b>&lt;1</b>	<1	0
Aluminum	ppm	ASTM D5185m >15	<b>3</b>	2	<1
Lead	ppm	ASTM D5185m >18	<b>9</b>	4	1
Copper	ppm	ASTM D5185m >80	<b>13</b>	6	2
Tin	ppm	ASTM D5185m >14	<b>1</b>	1	0
Vanadium	ppm	ASTM D5185m	<b>&lt;1</b>	<1	0
Cadmium	ppm	ASTM D5185m	<b>&lt;1</b>	<1	0

## ADDITIVES

	method	limit/base	current	history1	history2
Boron	ppm	ASTM D5185m 250	<b>20</b>	15	17
Barium	ppm	ASTM D5185m 10	<b>&lt;1</b>	0	0
Molybdenum	ppm	ASTM D5185m 100	<b>91</b>	62	57
Manganese	ppm	ASTM D5185m	<b>&lt;1</b>	<1	<1
Magnesium	ppm	ASTM D5185m 450	<b>1959</b>	1344	1273
Calcium	ppm	ASTM D5185m 3000	<b>1909</b>	1350	1339
Phosphorus	ppm	ASTM D5185m 1150	<b>1557</b>	1183	1022
Zinc	ppm	ASTM D5185m 1350	<b>1948</b>	1377	1308
Sulfur	ppm	ASTM D5185m 4250	<b>4369</b>	3617	3313

## CONTAMINANTS

	method	limit/base	current	history1	history2
Silicon	ppm	ASTM D5185m >20	<b>5</b>	4	2
Sodium	ppm	ASTM D5185m >158	<b>6</b>	2	2
Potassium	ppm	ASTM D5185m >20	<b>2</b>	2	0
Water	%	ASTM D6304 >0.1	<b>NEG</b>	NEG	NEG

## INFRA-RED

	method	limit/base	current	history1	history2
Soot %	%	*ASTM D7844	<b>0.2</b>	0.1	0.1
Nitration	Abs/cm	*ASTM D7624 >20	<b>12.3</b>	10.6	9.4
Sulfation	Abs/.1mm	*ASTM D7415 >30	<b>24.5</b>	23.1	22.0

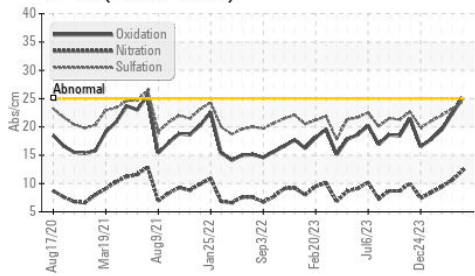
## FLUID DEGRADATION

	method	limit/base	current	history1	history2
Oxidation	Abs/.1mm	*ASTM D7414 >25	<b>25.1</b>	22.3	19.5
Base Number (BN)	mg KOH/g	ASTM D2896 8.5	<b>10.07</b>	11.46	11.43



# OIL ANALYSIS REPORT

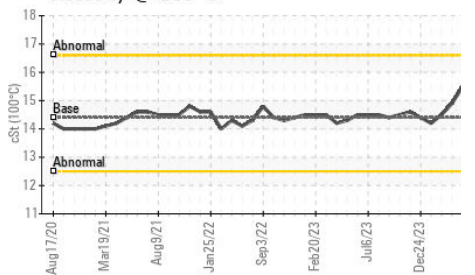
FT-IR (Direct Trend)



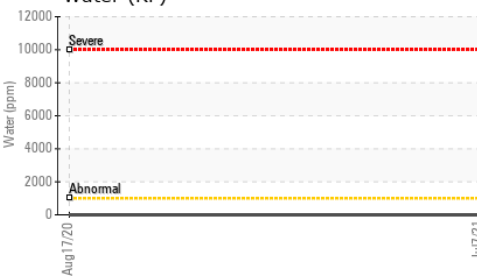
Water (KF)



Viscosity @ 100°C



Water (KF)

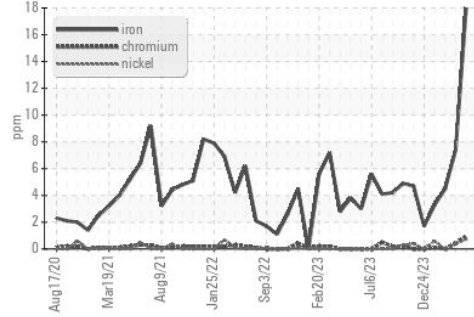


VISUAL	method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual	NONE	NONE	NONE
Appearance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

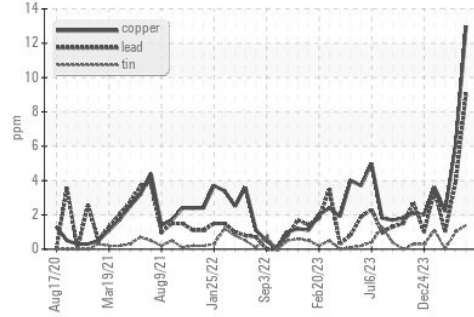
FLUID PROPERTIES	method	limit/base	current	history1	history2	
Visc @ 100°C	cSt	ASTM D445	14.4	15.5	14.9	14.5

## GRAPHS

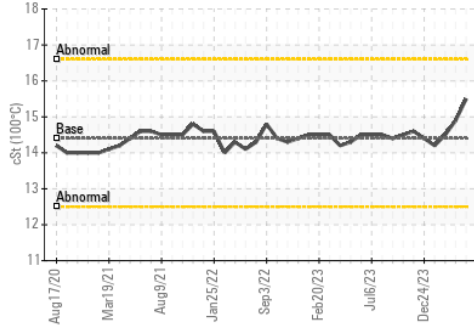
Ferrous Alloys



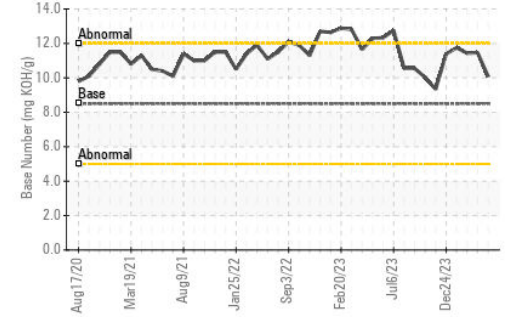
Non-ferrous Metals



Viscosity @ 100°C



Base Number



**Laboratory** : WearCheck USA - 501 Madison Ave., Cary, NC 27513  
**Sample No.** : WC0874818      **Received** : 16 May 2024  
**Lab Number** : 06181569      **Tested** : 20 May 2024  
**Unique Number** : 11032895      **Diagnosed** : 20 May 2024 - Sean Felton  
**Test Package** : IND 2 ( Additional Tests: KF )

**MARATHON PETROLEUM CO.**  
 101 12TH ST  
 CATLETTSBURG, KY  
 US 41169  
 Contact: CORY GUMBERT  
 cagumbert@marathonpetroleum.com

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)