

## **OIL ANALYSIS REPORT**

## Area Tampa [Tampa] Oil - Starboard Main Engine

Starboard Main Engine Fluid MOBIL 15W40 (150 GAL)

#### DIAGNOSIS

#### Recommendation

Resample at the next service interval to monitor.

#### Wear

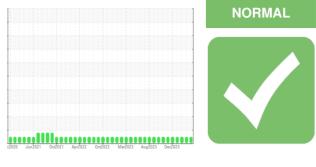
All component wear rates are normal.

#### 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.



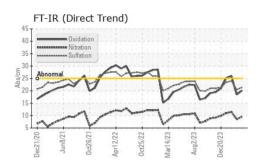
Sample Rating Trend

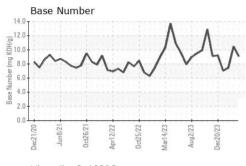
SAMPLE INFORM	ATION	method	limit/base	current	history1	history2
Sample Number		Client Info		WC0805302	WC0805303	WC0805289
Sample Date		Client Info		11 Apr 2024	13 Mar 2024	14 Feb 2024
Machine Age	hrs	Client Info		23200	6159	22046
Oil Age	hrs	Client Info		1225	1339	4000
Oil Changed		Client Info		Not Changd	Not Changd	Not Changd
Sample Status				NORMAL	NORMAL	NORMAL
CONTAMINATION	N	method	limit/base	current	history1	history2
Fuel		WC Method	>4.0	<1.0	<1.0	<1.0
Glycol		WC Method	2 1.0	NEG	NEG	NEG
-			12 . 14 /			
WEAR METALS		method	limit/base	current	history1	history2
Iron	ppm	ASTM D5185m	>75	4	6	18
Chromium	ppm	ASTM D5185m		<1	<1	0
Nickel	ppm	ASTM D5185m	>2	0	<1	0
Titanium	ppm	ASTM D5185m		<1	<1	1
Silver	ppm	ASTM D5185m	>2	0	<1	0
Aluminum	ppm	ASTM D5185m		2	3	2
Lead	ppm	ASTM D5185m	>18	0	<1	2
Copper	ppm	ASTM D5185m		6	5	18
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
ADDITIVES Boron	ppm	method ASTM D5185m	limit/base	current 71	history1 84	history2 55
Boron Barium	ppm ppm		limit/base			
Boron		ASTM D5185m	limit/base	71	84	55
Boron Barium	ppm	ASTM D5185m ASTM D5185m	limit/base	71 0	84 0	55 0
Boron Barium Molybdenum	ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	71 0 83	84 0 88	55 0 92
Boron Barium Molybdenum Manganese	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	71 0 83 <1 592 1607	84 0 88 <1	55 0 92 <1 704 1717
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus	ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	71 0 83 <1 592 1607 731	84 0 88 <1 601 1604 754	55 0 92 <1 704 1717 815
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc	ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	71 0 83 <1 592 1607 731 862	84 0 88 <1 601 1604 754 886	55 0 92 <1 704 1717 815 996
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus	ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	71 0 83 <1 592 1607 731	84 0 88 <1 601 1604 754	55 0 92 <1 704 1717 815
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc	ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	71 0 83 <1 592 1607 731 862	84 0 88 <1 601 1604 754 886	55 0 92 <1 704 1717 815 996
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur	ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	71 0 83 <1 592 1607 731 862 3321	84 0 88 <1 601 1604 754 886 3191	55 0 92 <1 704 1717 815 996 2873
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS	ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	71 0 83 <1 592 1607 731 862 3321 current	84 0 88 <1 601 1604 754 886 3191 history1	55 0 92 <1 704 1717 815 996 2873 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon	ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m <b>method</b>	limit/base	71 0 83 <1 592 1607 731 862 3321 current 4	84 0 88 <1 601 1604 754 886 3191 history1 5	55 0 92 <1 704 1717 815 996 2873 history2 4
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m <b>method</b> ASTM D5185m	limit/base >20 >118 >20	71 0 83 <1 592 1607 731 862 3321 current 4 2	84 0 88 <1 601 1604 754 886 3191 history1 5 2	55 0 92 <1 704 1717 815 996 2873 history2 4 3
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	limit/base >20 >118 >20	71 0 83 <1 592 1607 731 862 3321 <u>current</u> 4 2 1	84 0 88 <1 601 1604 754 886 3191 history1 5 2 2 2	55 0 92 <1 704 1717 815 996 2873 <b>bistory2</b> 4 3 0
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Water	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	limit/base >20 >118 >20 >0.1	71 0 83 <1 592 1607 731 862 3321 current 4 2 1 NEG	84 0 88 <1 601 1604 754 886 3191 history1 5 2 2 2 NEG	55 0 92 <1 704 1717 815 996 2873 history2 4 3 0 NEG
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Water INFRA-RED	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	limit/base >20 >118 >20 >0.1 limit/base	71 0 83 <1 592 1607 731 862 3321 current 4 2 1 8 2 1 NEG	84 0 88 <1 601 1604 754 886 3191 history1 5 2 2 2 NEG history1	55 0 92 <1 704 1717 815 996 2873 history2 4 3 0 NEG history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Water INFRA-RED Soot %	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	limit/base >20 >118 >20 >0.1 limit/base	71 0 83 <1 592 1607 731 862 3321 current 4 2 1 NEG current 0.2	84 0 88 <1 601 1604 754 886 3191 history1 5 2 2 2 NEG history1 0.1	55 0 92 <1 704 1717 815 996 2873 history2 4 3 0 NEG history2 0.4
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Water INFRA-RED Soot % Nitration	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	limit/base >20 >118 >20 >0.1 limit/base	71 0 83 <1 592 1607 731 862 3321 current 4 2 1 NEG 0.2 9.5	84 0 88 <1 601 1604 754 886 3191 history1 5 2 2 2 NEG NEG history1 0.1 8.5	55 0 92 <1 704 1717 815 996 2873 history2 4 3 0 NEG NEG history2 0.4 11.5
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Water INFRA-RED Soot % Nitration Sulfation FLUID DEGRADA	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	limit/base >20 >118 >20 >0.1 limit/base >20 >0.30	71 0 83 <1 592 1607 731 862 3321 current 4 2 3321 current 0.2 9.5 21.3 current	84 0 88 <1 601 1604 754 886 3191 history1 5 2 2 2 NEG history1 0.1 8.5 20.4	55 0 92 <1 704 1717 815 996 2873 <b>history2</b> 4 3 0 NEG <b>history2</b> 0.4 11.5 24.0
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Water INFRA-RED Soot % Nitration Sulfation	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	limit/base >20 >118 >20 >0.1 limit/base ≥20 >0.1 >0.1 limit/base >20 >30	71 0 83 <1 592 1607 731 862 3321 current 4 2 1 NEG current 0.2 9.5 21.3	84 0 88 <1 601 1604 754 886 3191 <b>history1</b> 5 2 2 2 NEG <b>history1</b> 0.1 8.5 20.4 <b>history1</b>	55 0 92 <1 704 1717 815 996 2873 history2 4 3 0 NEG NEG history2 0.4 11.5 24.0 history2

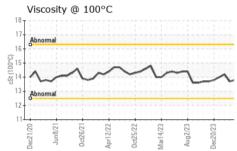
### Report Id: MARCAT [WUSCAR] 06157863 (Generated: 04/25/2024 20:11:46) Rev: 1



# **OIL ANALYSIS REPORT**





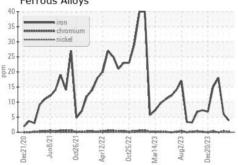


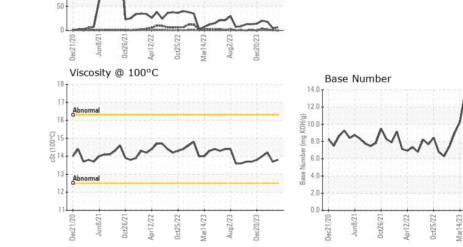
VISUAL		method				history2
White Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual	NONE	NONE	NONE	NONE
Appearance	scalar	*Visual	NORML	NORML	NORML	NORML
Odor	scalar	*Visual	NORML	NORML	NORML	NORML
Emulsified Water	scalar	*Visual	>0.1	NEG	NEG	NEG
Free Water	scalar	*Visual		NEG	NEG	NEG
FLUID PROPERT	TIES	method	limit/base	current	history1	history2
Visc @ 100°C	cSt	ASTM D445		13.8	13.7	14.2
GRAPHS						

Ferrous Alloys

Non-ferrous Metals

250





Laboratory : WearCheck USA - 501 Madison Ave., Cary, NC 27513 MARATHON PETROLEUM CO. : WC0805302 Sample No. Received : 23 Apr 2024 101 12TH ST Lab Number : 06157863 Tested : 25 Apr 2024 CATLETTSBURG, KY Unique Number : 10993286 Diagnosed : 25 Apr 2024 - Sean Felton US 41169 Test Package : IND 2 (Additional Tests: KF) Contact: CORY GUMBERT Certificate 12367 cagumbert@marathonpetroleum.com To discuss this sample report, contact Customer Service at 1-800-237-1369. T: (606)585-3950 \* - Denotes test methods that are outside of the ISO 17025 scope of accreditation. F: x:

Statements of conformity to specifications are based on the simple acceptance decision rule (JCGM 106:2012)

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Submitted By: M/V TAMPA

Aug2/23

Dec20/23

Page 2 of 2