

## **OIL ANALYSIS REPORT**

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

Starboard Main Engine

MOBIL 15W40 (210 GAL)

#### DIAGNOSIS

#### Recommendation

Resample at the next service interval to monitor.

#### Wear

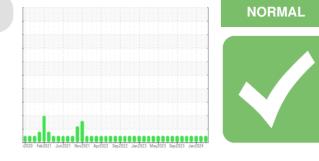
All component wear rates are normal.

#### 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.

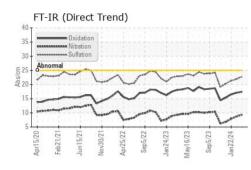


Sample Rating Trend

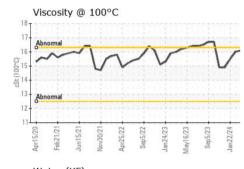
SAMPLE INFORM	<b>IATION</b>	method	limit/base	current	history1	history2
Sample Number		Client Info		WC0874900	WC0846029	WC0846032
Sample Date		Client Info		18 Mar 2024	20 Feb 2024	22 Jan 2024
Machine Age	hrs	Client Info		59051	58512	57894
Oil Age	hrs	Client Info		2363	1825	1207
Oil Changed		Client Info		Not Changd	Filtered	Filtered
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		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		>14	<1	0	1
Vanadium	ppm	ASTM D5185m		0	0	<1
Cadmium	ppm	ASTM D5185m		0	0	<1
ADDITIVES		method				history2
	maa		limit/base			
Boron	ppm ppm	ASTM D5185m	limit/base	50	51	59
Boron Barium	ppm	ASTM D5185m ASTM D5185m	limit/base	50 0	51 0	59 0
Boron Barium Molybdenum	ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	50 0 47	51 0 44	59 0 42
Boron Barium Molybdenum Manganese	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	50 0 47 <1	51 0 44 <1	59 0 42 2
Boron Barium Molybdenum Manganese Magnesium	ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	50 0 47 <1 1062	51 0 44 <1 1056	59 0 42 2 936
Boron Barium Molybdenum Manganese Magnesium Calcium	ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	50 0 47 <1 1062 1587	51 0 44 <1 1056 1671	59 0 42 2 936 1492
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	50 0 47 <1 1062 1587 1049	51 0 44 <1 1056 1671 980	59 0 42 2 936 1492 981
Boron Barium Molybdenum Manganese Magnesium Calcium	ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	50 0 47 <1 1062 1587	51 0 44 <1 1056 1671	59 0 42 2 936 1492
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	50 0 47 <1 1062 1587 1049 1296	51 0 44 <1 1056 1671 980 1276	59 0 42 2 936 1492 981 1227
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		50 0 47 <1 1062 1587 1049 1296 3749	51 0 44 <1 1056 1671 980 1276 3354	59 0 42 2 936 1492 981 1227 3155
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS	ppm 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	50 0 47 <1 1062 1587 1049 1296 3749 current	51 0 44 <1 1056 1671 980 1276 3354 history1	59 0 42 2 936 1492 981 1227 3155 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon	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>	limit/base	50 0 47 <1 1062 1587 1049 1296 3749 current 2	51 0 44 <1 1056 1671 980 1276 3354 history1 2	59 0 42 2 936 1492 981 1227 3155 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	50 0 47 <1 1062 1587 1049 1296 3749 current 2 3	51 0 44 <1 1056 1671 980 1276 3354 history1 2 2 2	59 0 42 2 936 1492 981 1227 3155 history2 4 4
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	limit/base >20 >118 >20	50 0 47 <1 1062 1587 1049 1296 3749 <u>current</u> 2 3 3	51 0 44 <1 1056 1671 980 1276 3354 history1 2 2 2 2	59 0 42 2 936 1492 981 1227 3155 history2 4 4 4 7
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	50 0 47 <1 1062 1587 1049 1296 3749 <u>current</u> 2 3 3 3 NEG	51 0 44 <1 1056 1671 980 1276 3354 history1 2 2 2 2 NEG history1	59 0 42 2 936 1492 981 1227 3155 history2 4 4 4 7 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	50 0 47 <1 1062 1587 1049 1296 3749 <i>current</i> 2 3 3 NEG <i>current</i> 1.3	51 0 44 <1 1056 1671 980 1276 3354 history1 2 2 2 2 2 NEG history1 1.2	59 0 42 2 936 1492 981 1227 3155 history2 4 4 4 7 NEG history2 0.9
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	50 0 47 <1 1062 1587 1049 1296 3749 <u>current</u> 2 3 3 3 NEG	51 0 44 <1 1056 1671 980 1276 3354 history1 2 2 2 2 NEG history1	59 0 42 2 936 1492 981 1227 3155 history2 4 4 4 7 NEG history2
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	50 0 47 <1 1062 1587 1049 1296 3749 Current 2 3 3 NEG 0 Urrent 1.3 9.3	51 0 44 <1 1056 1671 980 1276 3354 history1 2 2 2 2 2 NEG history1 1.2 8.7	59 0 42 2 936 1492 981 1227 3155 history2 4 4 4 4 7 NEG NEG 0.9 7.9
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 D7844 *ASTM D7844	limit/base >20 >118 >20 >0.1 limit/base >20 >30	50 0 47 <1 1062 1587 1049 1296 3749 Current 2 3 3 749 Current 1.3 9.3 22.8 Current	51 0 44 <1 1056 1671 980 1276 3354 history1 2 2 2 2 2 NEG history1 1.2 8.7 21.9 history1	59 0 42 2 936 1492 981 1227 3155 history2 4 4 4 7 NEG history2 0.9 7.9 21.3
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Vater 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 >0.2 >0.1	50 0 47 <1 1062 1587 1049 1296 3749 <u>current</u> 2 3 3 3 NEG <u>current</u> 1.3 9.3 22.8	51 0 44 <1 1056 1671 980 1276 3354 history1 2 2 2 2 2 NEG history1 1.2 8.7 21.9	59 0 42 2 936 1492 981 1227 3155 <b>history2</b> 4 4 4 7 NEG <b>history2</b> 0.9 7.9 21.3

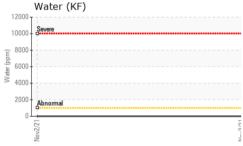


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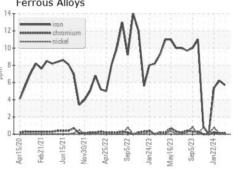




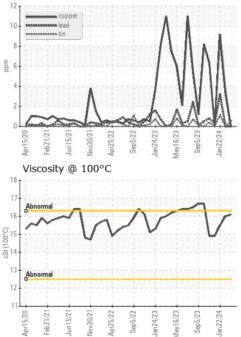


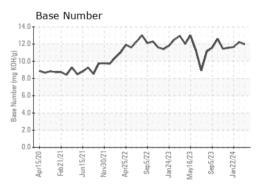
VISUAL		method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual	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	IES	method	limit/base	current	history1	history2
Visc @ 100°C	cSt	ASTM D445		16.1	16.0	15.5
GRAPHS						

Ferrous Alloys



Non-ferrous Metals





Laboratory : WearCheck USA - 501 Madison Ave., Cary, NC 27513 MARATHON PETROLEUM CO. Sample No. : WC0874900 Received : 23 Apr 2024 101 12TH ST Lab Number : 06157873 Tested : 25 Apr 2024 CATLETTSBURG, KY Unique Number : 10993296 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)

Report Id: MARCAT [WUSCAR] 06157873 (Generated: 04/25/2024 20:14:48) Rev: 1

Submitted By: M/V NASHVILLE