

OIL ANALYSIS REPORT

Sample Rating Trend

NORMAL

Nashville [Nashville] Oil - Starboard Main Engine

Starboard Main Engine

MOBIL 15W40 (150 GAL)

DIAGNOSIS

Recommendation

Resample at the next service interval to monitor. (Customer Sample Comment: Parnell)

Wear

All component wear rates are normal.

Contamination

There is no indication of any contamination in the

Fluid Condition

The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is acceptable for the time in service.

2020 Feb:2021 Jun;2021 Nov2021 Apr2022 Sep;2022 Jun;2023 May;2023 Sep;2023							
SAMPLE INFORM	MATION	method	limit/base	current	history1	history2	
Sample Number		Client Info		WC0846037	WC0805236	WC0805253	
Sample Date		Client Info		24 Dec 2023	27 Nov 2023	03 Oct 2023	
Machine Age	hrs	Client Info		57293	56827	56190	
Oil Age	hrs	Client Info		605	140	5241	
Oil Changed		Client Info		Changed	Filtered	Not Changd	
Sample Status				NORMAL	NORMAL	NORMAL	
CONTAMINATION	٧	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	0	<1	11	
Chromium	ppm	ASTM D5185m	>8	0	0	<1	
Nickel	ppm	ASTM D5185m	>2	0	<1	0	
Titanium	ppm	ASTM D5185m	>3	0	<1	<1	
Silver	ppm	ASTM D5185m	>2	0	0	0	
Aluminum	ppm	ASTM D5185m	>15	<1	1	<1	
Lead	ppm	ASTM D5185m	>18	<1	<1	<1	
Copper	ppm	ASTM D5185m	>80	0	6	8	
Tin	ppm	ASTM D5185m	>14	0	<1	0	
Vanadium	ppm	ASTM D5185m		0	<1	0	
Cadmium	ppm	ASTM D5185m		0	0	0	
ADDITIVES		method	limit/base	current	history1	history2	
ADDITIVES Boron	ppm	method ASTM D5185m	limit/base	current 64	history1	history2 47	
	ppm		limit/base				
Boron		ASTM D5185m	limit/base	64	68	47	
Boron Barium	ppm	ASTM D5185m ASTM D5185m	limit/base	64 0	68 <1	47 <1 44 <1	
Boron Barium Molybdenum	ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	64 0 35	68 <1 33 0 866	47 <1 44	
Boron Barium Molybdenum Manganese Magnesium Calcium	ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	64 0 35 0 892 1581	68 <1 33 0	47 <1 44 <1	
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	64 0 35 0 892 1581 934	68 <1 33 0 866 1475 987	47 <1 44 <1 888 1724 1058	
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc	ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	64 0 35 0 892 1581 934 1274	68 <1 33 0 866 1475 987 1228	47 <1 44 <1 888 1724 1058 1351	
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus	ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	64 0 35 0 892 1581 934	68 <1 33 0 866 1475 987	47 <1 44 <1 888 1724 1058	
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 ASTM D5185m ASTM D5185m	limit/base	64 0 35 0 892 1581 934 1274	68 <1 33 0 866 1475 987 1228	47 <1 44 <1 888 1724 1058 1351	
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 ASTM D5185m		64 0 35 0 892 1581 934 1274 3347	68 <1 33 0 866 1475 987 1228 3058	47 <1 44 <1 888 1724 1058 1351 3839	
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 ASTM D5185m	limit/base	64 0 35 0 892 1581 934 1274 3347 current	68 <1 33 0 866 1475 987 1228 3058 history1	47 <1 44 <1 888 1724 1058 1351 3839 history2	
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	limit/base	64 0 35 0 892 1581 934 1274 3347 current	68 <1 33 0 866 1475 987 1228 3058 history1	47 <1 44 <1 888 1724 1058 1351 3839 history2	
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	limit/base >20 >118	64 0 35 0 892 1581 934 1274 3347 current	68 <1 33 0 866 1475 987 1228 3058 history1 4 <1	47 <1 44 <1 888 1724 1058 1351 3839 history2 3 2	
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium	ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	limit/base >20 >118 >20	64 0 35 0 892 1581 934 1274 3347 current 1 1	68 <1 33 0 866 1475 987 1228 3058 history1 4 <1 5	47 <1 44 <1 888 1724 1058 1351 3839 history2 3 2 5	
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Water	ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	limit/base >20 >118 >20 >0.1	64 0 35 0 892 1581 934 1274 3347 current 1 1 4 NEG	68 <1 33 0 866 1475 987 1228 3058 history1 4 <1 5 NEG	47 <1 44 <1 888 1724 1058 1351 3839 history2 3 2 5 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 D6304	limit/base >20 >118 >20 >0.1 limit/base	64 0 35 0 892 1581 934 1274 3347 current 1 1 4 NEG	68 <1 33 0 866 1475 987 1228 3058 history1 4 <1 5 NEG history1	47 <1 44 <1 888 1724 1058 1351 3839 history2 3 2 5 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	limit/base >20 >118 >20 >0.1 limit/base	64 0 35 0 892 1581 934 1274 3347 current 1 1 4 NEG current 0.6	68 <1 33 0 866 1475 987 1228 3058 history1 4 <1 5 NEG history1 0.4	47 <1 44 <1 888 1724 1058 1351 3839 history2 3 2 5 NEG history2 2	
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 D6304 method *ASTM D7844 *ASTM D7824	limit/base >20 >118 >20 >0.1 limit/base	64 0 35 0 892 1581 934 1274 3347 current 1 1 4 NEG current 0.6 6.8	68 <1 33 0 866 1475 987 1228 3058 history1 4 <1 5 NEG history1 0.4 6.2	47 <1 44 <1 888 1724 1058 1351 3839 history2 3 2 5 NEG history2 2 10.4	
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 D6304 method *ASTM D7844 *ASTM D7624 *ASTM D76145	limit/base >20 >118 >20 >0.1 limit/base >20 >0.3	64 0 35 0 892 1581 934 1274 3347 current 1 1 4 NEG current 0.6 6.8 20.3	68 <1 33 0 866 1475 987 1228 3058 history1 4 <1 5 NEG history1 0.4 6.2 19.1	47 <1 44 <1 888 1724 1058 1351 3839 history2 3 2 5 NEG history2 2 10.4 24.2	



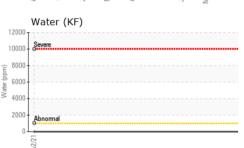
OIL ANALYSIS REPORT

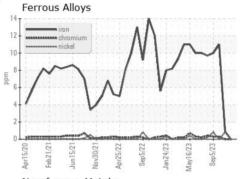


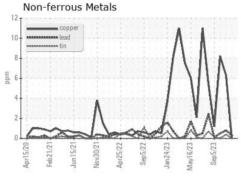
VISUAL		method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	NONE	NONE	LIGHT
Yellow Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual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

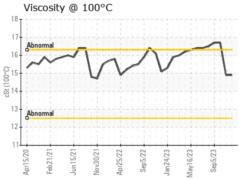
Viso	cosity	@ 1	00°C					
17-	ormal							$\overline{}$
16	~	~	V	~		V		
()-001) 14-								
13 - Abno								
Apr15/20	Feb21/21	Jun15/21-	Nov30/21	Apr25/22	Sep5/22	Jan24/23 -	May16/23 -	Sep5/23

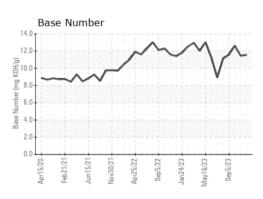
FLUID PROPERTIES		method limit/base			history1	history2
Visc @ 100°C	cSt	ASTM D445		14.9	14.9	16.7
GRAPHS						















Laboratory Sample No. Lab Number **Unique Number**

: WC0846037 : 06058313 : 10829695

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

: 11 Jan 2024 : 12 Jan 2024 Diagnostician : Sean Felton

Test Package : IND 2 (Additional Tests: KF)

Certificate L2367 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)

MARATHON PETROLEUM CO.

101 12TH ST CATLETTSBURG, KY US 41169

Contact: CORY GUMBERT

cagumbert@marathonpetroleum.com

T: (606)585-3950 F: x: