

# **OIL ANALYSIS REPORT**

### Sample Rating Trend

### NORMAL

# Martinsville Machine Id [Martinsville] Oil - Starboard Main Engine

**Starboard Main Engine** 

**DIESEL ENGINE OIL SAE 15W40 (150 GAL)** 

Starboard Main Engine

# Recommendation

DIAGNOSIS

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**

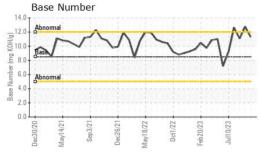
The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.

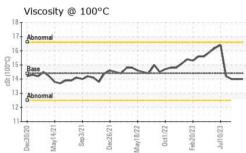


SAMPLE INFORM	/// TITIOTT	method	ilmit/base	current	nistory i	nistoryz
Sample Number		Client Info		WC0805442	WC0769131	WC0769079
Sample Date		Client Info		29 Oct 2023	03 Oct 2023	04 Sep 2023
Machine Age	hrs	Client Info		18158	17533	17312
Oil Age	hrs	Client Info		1822	1197	993
Oil Changed		Client Info		Filtered	Not Changd	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
WEADMETALC		ام مالم مما	1:00:4/10000		lai ata mud	history.O
WEAR METALS		method	limit/base	current	history1	history2
Iron	ppm	ASTM D5185m	>75	8	7	6
Chromium	ppm	ASTM D5185m	>8	<1	0	0
Nickel	ppm	ASTM D5185m	>2	<1	0	0
Titanium	ppm	ASTM D5185m	>3	<1	<1	0
Silver	ppm	ASTM D5185m	>2	0	0	0
Aluminum	ppm	ASTM D5185m	>15	2	<1	<1
Lead	ppm	ASTM D5185m	>18	2	2	2
Copper	ppm	ASTM D5185m	>80	11	11	8
Tin	ppm	ASTM D5185m	>14	0	<1	<1
Vanadium	ppm	ASTM D5185m		0	0	0
Cadmium	ppm	ASTM D5185m		<1	0	0
ADDITIVES		method	limit/base	current	history1	history2
						HISTOLYZ
					,	· · · · · · · · · · · · · · · · · · ·
Boron	ppm	ASTM D5185m	250	82	101	128
Boron Barium	ppm	ASTM D5185m ASTM D5185m	250 10	82 2	101	128 0
Boron		ASTM D5185m	250	82 2 73	101 <1 84	128
Boron Barium Molybdenum Manganese	ppm	ASTM D5185m ASTM D5185m	250 10 100	82 2 73 0	101 <1 84 <1	128 0 82 <1
Boron Barium Molybdenum	ppm	ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100 450	82 2 73	101 <1 84 <1 1113	128 0 82
Boron Barium Molybdenum Manganese	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100	82 2 73 0	101 <1 84 <1	128 0 82 <1
Boron Barium Molybdenum Manganese Magnesium	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100 450	82 2 73 0 1050	101 <1 84 <1 1113	128 0 82 <1 1200
Boron Barium Molybdenum Manganese Magnesium Calcium	ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100 450 3000	82 2 73 0 1050 1162	101 <1 84 <1 1113 1227	128 0 82 <1 1200 1393
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 ASTM D5185m	250 10 100 450 3000 1150	82 2 73 0 1050 1162 793	101 <1 84 <1 1113 1227 863	128 0 82 <1 1200 1393 892
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	250 10 100 450 3000 1150 1350	82 2 73 0 1050 1162 793 978	101 <1 84 <1 1113 1227 863 1060	128 0 82 <1 1200 1393 892 1116
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS	ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	250 10 100 450 3000 1150 1350 4250	82 2 73 0 1050 1162 793 978 2986	101 <1 84 <1 1113 1227 863 1060 3082 history1	128 0 82 <1 1200 1393 892 1116 3666 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >20	82 2 73 0 1050 1162 793 978 2986 current	101 <1 84 <1 1113 1227 863 1060 3082 history1 3	128 0 82 <1 1200 1393 892 1116 3666 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium	ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >20 >158	82 2 73 0 1050 1162 793 978 2986 current 4	101 <1 84 <1 1113 1227 863 1060 3082 history1 3 0	128 0 82 <1 1200 1393 892 1116 3666 history2 4
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >20 >158 >20	82 2 73 0 1050 1162 793 978 2986 current	101 <1 84 <1 1113 1227 863 1060 3082 history1 3 0 2	128 0 82 <1 1200 1393 892 1116 3666 history2 4 1
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium	ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >20 >158	82 2 73 0 1050 1162 793 978 2986 current 4	101 <1 84 <1 1113 1227 863 1060 3082 history1 3 0	128 0 82 <1 1200 1393 892 1116 3666 history2 4
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium	ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >20 >158 >20	82 2 73 0 1050 1162 793 978 2986 current 4 2	101 <1 84 <1 1113 1227 863 1060 3082 history1 3 0 2	128 0 82 <1 1200 1393 892 1116 3666 history2 4 1
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED	ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >20 >158 >20 limit/base	82 2 73 0 1050 1162 793 978 2986 current 4 2 2	101 <1 84 <1 1113 1227 863 1060 3082 history1 3 0 2	128 0 82 <1 1200 1393 892 1116 3666 history2 4 1 2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot %	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m  method  *ASTM D5185m  ASTM D5185m  ASTM D5185m  ASTM D5185m  ASTM D5185m  ASTM D5185m  ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >20 >158 >20 limit/base	82 2 73 0 1050 1162 793 978 2986 current 4 2 2 current 0.3	101 <1 84 <1 1113 1227 863 1060 3082 history1 3 0 2 history1 0.3	128 0 82 <1 1200 1393 892 1116 3666 history2 4 1 2 history2 0.2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot % Nitration Sulfation	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m  method  *ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m  *ASTM D5185m  *ASTM D7844  *ASTM D7624  *ASTM D76145	250 10 100 450 3000 1150 1350 4250 limit/base >20 >158 >20 limit/base	82 2 73 0 1050 1162 793 978 2986 current 4 2 2 current 0.3 8.4 21.8	101 <1 84 <1 1113 1227 863 1060 3082 history1 3 0 2 history1 0.3 7.8 21.2	128 0 82 <1 1200 1393 892 1116 3666 history2 4 1 2 history2 0.2 7.4 20.8
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot % Nitration Sulfation FLUID DEGRADA	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m  method  *ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m  method  *ASTM D7844  *ASTM D7844  *ASTM D7844  *ASTM D7844  *ASTM D7844	250 10 100 100 450 3000 1150 1350 4250 limit/base >20 >158 >20 limit/base >20 >imit/base	82 2 73 0 1050 1162 793 978 2986 current 4 2 2 current 0.3 8.4 21.8 current	101 <1 84 <1 1113 1227 863 1060 3082 history1 3 0 2 history1 0.3 7.8 21.2 history1	128 0 82 <1 1200 1393 892 1116 3666 history2 4 1 2 history2 0.2 7.4 20.8 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot % Nitration Sulfation FLUID DEGRADA Oxidation	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m  method  *ASTM D5185m  *ASTM D5185m  ASTM D5185m  ASTM D5185m  *ASTM D5185m  method  *ASTM D7844  *ASTM D7624  *ASTM D7415  method  *ASTM D7414	250 10 100 450 3000 1150 1350 4250 limit/base >20 >158 >20 limit/base >20 >30 limit/base >25	82 2 73 0 1050 1162 793 978 2986 current 4 2 2 current 0.3 8.4 21.8 current	101 <1 84 <1 1113 1227 863 1060 3082 history1 3 0 2 history1 0.3 7.8 21.2 history1 16.0	128 0 82 <1 1200 1393 892 1116 3666 history2 4 1 2 history2 0.2 7.4 20.8 history2 15.4
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot % Nitration Sulfation FLUID DEGRADA	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m  method  *ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m  method  *ASTM D7844  *ASTM D7844  *ASTM D7844  *ASTM D7844  *ASTM D7844	250 10 100 450 3000 1150 1350 4250 limit/base >20 >158 >20 limit/base >20 >30 limit/base >25	82 2 73 0 1050 1162 793 978 2986 current 4 2 2 current 0.3 8.4 21.8 current	101 <1 84 <1 1113 1227 863 1060 3082 history1 3 0 2 history1 0.3 7.8 21.2 history1	128 0 82 <1 1200 1393 892 1116 3666 history2 4 1 2 history2 0.2 7.4 20.8 history2



## **OIL ANALYSIS REPORT**

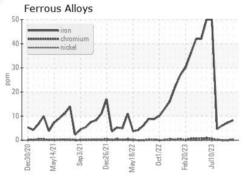


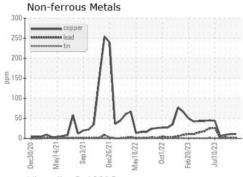


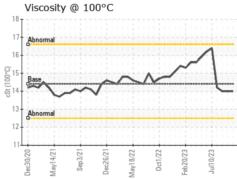
VISUAL		method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual	NONE	NONE	NONE	NONE
Appearance	scalar	*Visual	NORML	NORML	NORML	NORML
Odor	scalar	*Visual	NORML	NORML	NORML	NORML
<b>Emulsified Water</b>	scalar	*Visual	>0.1	NEG	NEG	NEG
Free Water	scalar	*Visual		NEG	NEG	NEG

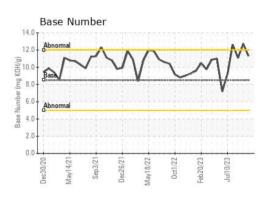
FLUID PROPERTIES		method				history2
Visc @ 100°C	cSt	ASTM D445	14.4	14.0	14.0	14.0

### **GRAPHS**













Certificate L2367

Laboratory Sample No. Lab Number

Unique Number : 10727572

: WC0805442 : 05999212

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

: 07 Nov 2023 Diagnostician : Sean Felton

: 06 Nov 2023

Test Package : IND 2 (Additional Tests: KF)

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. MARATHON PETROLEUM CO.

101 12TH ST CATLETTSBURG, KY US 41169

Contact: CORY GUMBERT

cagumbert@marathonpetroleum.com T: (606)585-3950

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

F: x: