

OIL ANALYSIS REPORT

Sample Rating Trend

NORMAL



Martinsville Machine Id [Martinsville] Oil - Starboard Main Engine

Starboard Main Engine

Fluid

DIESEL ENGINE OIL SAE 15W40 (150 GAL)

DIAGNOSIS

Recommendation

Resample at the next service interval to monitor.

Wear

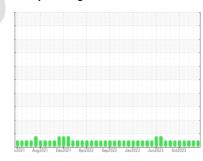
All component wear rates are normal.

Contamination

There is no indication of any contamination in the oil

Fluid Condition

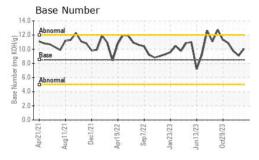
The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.

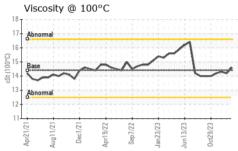


SAMPLE INFORM	MATION	method	limit/base	current	history1	history2
Sample Number		Client Info		WC0735540	WC0735523	WC0845816
Sample Date		Client Info		15 Feb 2024	21 Jan 2024	23 Dec 2023
Machine Age	hrs	Client Info		20454	19913	19319
Oil Age	hrs	Client Info		4114	3602	2977
Oil Changed		Client Info		Filtered	Not Changd	Filtered
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	71.0	NEG	NEG	NEG
				MEG		
WEAR METALS		method	limit/base	current	history1	history2
Iron	ppm	ASTM D5185m	>75	17	15	13
Chromium	ppm	ASTM D5185m	>8	0	<1	<1
Nickel	ppm	ASTM D5185m	>2	0	<1	0
Titanium	ppm	ASTM D5185m	>3	0	<1	0
Silver	ppm	ASTM D5185m	>2	0	<1	0
Aluminum	ppm	ASTM D5185m	>15	0	3	2
Lead	ppm	ASTM D5185m	>18	1	5	3
Copper	ppm	ASTM D5185m	>80	11	16	15
Tin	ppm	ASTM D5185m	>14	0	1	<1
Vanadium	ppm	ASTM D5185m		0	<1	0
Cadmium	ppm	ASTM D5185m		0	<1	0
ADDITIVES						
ADDITIVES		method	IIIIII/Dase	current	history1	history2
Boron	ppm	ASTM D5185m	250	54	69	74
	ppm ppm	ASTM D5185m				
Boron		ASTM D5185m	250	54	69	74
Boron Barium	ppm	ASTM D5185m ASTM D5185m	250 10	54 0	69 0	74 0
Boron Barium Molybdenum	ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m	250 10	54 0 71	69 0 77	74 0 77
Boron Barium Molybdenum Manganese	ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100	54 0 71 0	69 0 77 2	74 0 77 <1
Boron Barium Molybdenum Manganese Magnesium	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100 450	54 0 71 0 1341	69 0 77 2 1214	74 0 77 <1 1227
Boron Barium Molybdenum Manganese Magnesium Calcium	ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100 450 3000	54 0 71 0 1341 1305	69 0 77 2 1214 1215	74 0 77 <1 1227 1249
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	250 10 100 450 3000 1150	54 0 71 0 1341 1305 860	69 0 77 2 1214 1215 876	74 0 77 <1 1227 1249 908
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	54 0 71 0 1341 1305 860	69 0 77 2 1214 1215 876 1118	74 0 77 <1 1227 1249 908 1128
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	250 10 100 450 3000 1150 1350 4250	54 0 71 0 1341 1305 860 1141 3317	69 0 77 2 1214 1215 876 1118 2713	74 0 77 <1 1227 1249 908 1128 2824
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 limit/base >20	54 0 71 0 1341 1305 860 1141 3317 current	69 0 77 2 1214 1215 876 1118 2713	74 0 77 <1 1227 1249 908 1128 2824 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >20	54 0 71 0 1341 1305 860 1141 3317 current	69 0 77 2 1214 1215 876 1118 2713 history1 4 4	74 0 77 <1 1227 1249 908 1128 2824 history2 4 3 <1
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >20 >158 >20	54 0 71 0 1341 1305 860 1141 3317 current 3	69 0 77 2 1214 1215 876 1118 2713 history1	74 0 77 <1 1227 1249 908 1128 2824 history2 4 3
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	54 0 71 0 1341 1305 860 1141 3317 current 3 0	69 0 77 2 1214 1215 876 1118 2713 history1 4 4	74 0 77 <1 1227 1249 908 1128 2824 history2 4 3 <1
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	250 10 100 450 3000 1150 1350 4250 limit/base >20 >158 >20 >0.1	54 0 71 0 1341 1305 860 1141 3317 current 3 0 0 NEG	69 0 77 2 1214 1215 876 1118 2713 history1 4 4 NEG	74 0 77 <1 1227 1249 908 1128 2824 history2 4 3 <1 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	250 10 100 450 3000 1150 1350 4250 limit/base >20 >158 >20 >0.1	54 0 71 0 1341 1305 860 1141 3317 current 3 0 0 NEG	69 0 77 2 1214 1215 876 1118 2713 history1 4 4 NEG	74 0 77 <1 1227 1249 908 1128 2824 history2 4 3 <1 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	250 10 100 450 3000 1150 1350 4250 limit/base >20 >158 >20 >0.1 limit/base	54 0 71 0 1341 1305 860 1141 3317 current 3 0 0 NEG current	69 0 77 2 1214 1215 876 1118 2713 history1 4 4 NEG history1	74 0 77 <1 1227 1249 908 1128 2824 history2 4 3 <1 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 D6304 method *ASTM D7844 *ASTM D7844	250 10 100 450 3000 1150 1350 4250 limit/base >20 >158 >20 >0.1 limit/base	54 0 71 0 1341 1305 860 1141 3317 current 3 0 0 NEG current 0.4 10.3	69 0 77 2 1214 1215 876 1118 2713 history1 4 4 NEG history1 0.4 9.8	74 0 77 <1 1227 1249 908 1128 2824 history2 4 3 <1 NEG history2 0.4 9.7
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	250 10 100 450 3000 1150 1350 4250 limit/base >20 >158 >20 >0.1 limit/base	54 0 71 0 1341 1305 860 1141 3317 current 3 0 0 NEG current 0.4 10.3 22.9	69 0 77 2 1214 1215 876 1118 2713 history1 4 4 NEG history1 0.4 9.8 22.7	74 0 77 <1 1227 1249 908 1128 2824 history2 4 3 <1 NEG history2 0.4 9.7 22.5
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 D6304 method *ASTM D7844 *ASTM D7624 *ASTM D7415 method	250 10 100 450 3000 1150 1350 4250 limit/base >20 >0.1 limit/base >20 >30 limit/base	54 0 71 0 1341 1305 860 1141 3317 current 3 0 0 NEG current 0.4 10.3 22.9 current	69 0 77 2 1214 1215 876 1118 2713 history1 4 4 NEG history1 0.4 9.8 22.7 history1	74 0 77 <1 1227 1249 908 1128 2824 history2 4 3 <1 NEG history2 0.4 9.7 22.5



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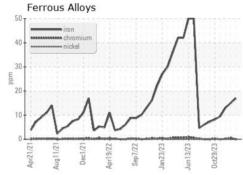


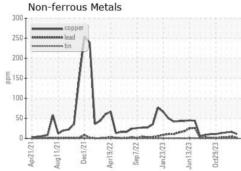


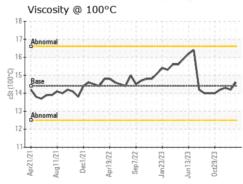
VISUAL		method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual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

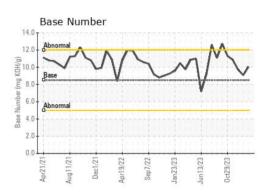
FLUID PROPERTIES		method				history2
Visc @ 100°C	cSt	ASTM D445	14.4	14.6	14.2	14.3

GRAPHS













Laboratory Sample No. Lab Number : 06122604 Unique Number: 10936755

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 : WC0735540

Received

Tested Diagnosed

: 19 Mar 2024 : 21 Mar 2024 : 21 Mar 2024 - Jonathan Hester MARATHON PETROLEUM CO. 101 12TH ST

CATLETTSBURG, KY US 41169

Test Package : IND 2 (Additional Tests: KF) To discuss this sample report, contact Customer Service at 1-800-237-1369.

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

* - 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)

F: x: