

OIL ANALYSIS REPORT

Sample Rating Trend

Area

Martinsville [Martinsville] Oil - Starboard Main Engine

Starboard Main Engine

Fluid

DIESEL ENGINE OIL SAE 15W40 (150 GAL)





NORMAL

DIAGNOSIS

Recommendation

Resample at the next service interval to monitor.

Woor

All component wear rates are normal.

Contamination

There is no indication of any contamination in the oil

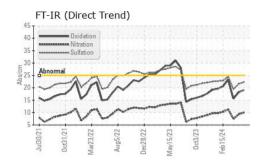
Fluid Condition

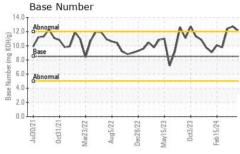
The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.

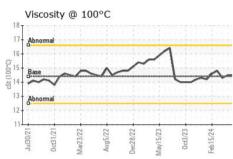
SAMPLE INFORM	MATION	method	limit/base	current	history1	history2
Sample Number		Client Info		WC0735181	WC0845881	WC0860090
Sample Date		Client Info		07 Jun 2024	11 May 2024	13 Apr 2024
Machine Age	hrs	Client Info		22678	22069	21632
Oil Age	hrs	Client Info		1604	996	557
Oil Changed		Client Info		Filtered	Not Changd	Filtered
Sample Status				NORMAL	NORMAL	NORMAL
CONTAMINATION	١	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	14	12	6
Chromium	ppm	ASTM D5185m	>8	<1	<1	<1
Nickel	ppm	ASTM D5185m	>2	<1	<1	0
Titanium	ppm	ASTM D5185m	>3	<1	<1	<1
Silver	ppm	ASTM D5185m	>2	0	<1	<1
Aluminum	ppm	ASTM D5185m	>15	3	2	2
Lead	ppm	ASTM D5185m	>18	3	3	2
Copper	ppm	ASTM D5185m	>80	17	14	8
Tin	ppm	ASTM D5185m	>14	<1	2	1
Vanadium	ppm	ASTM D5185m		0	<1	<1
Cadmium	ppm	ASTM D5185m		<1	<1	<1
						111
ADDITIVES		method	limit/base	current	history1	history2
ADDITIVES Boron	ppm	method ASTM D5185m	limit/base 250	current 20	history1 22	nistory2 28
	ppm					
Boron		ASTM D5185m	250	20	22	28
Boron Barium	ppm	ASTM D5185m ASTM D5185m	250 10	20 0	22 0	28
Boron Barium Molybdenum	ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m	250 10	20 0 71	22 0 69	28 0 69
Boron Barium Molybdenum Manganese	ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100	20 0 71 <1	22 0 69 <1	28 0 69
Boron Barium Molybdenum Manganese Magnesium	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100 450	20 0 71 <1 1568	22 0 69 <1 1560	28 0 69 0 1507
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	20 0 71 <1 1568 1267	22 0 69 <1 1560 1268	28 0 69 0 1507 1235
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	250 10 100 450 3000 1150	20 0 71 <1 1568 1267 1043	22 0 69 <1 1560 1268 1166	28 0 69 0 1507 1235 1224
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	20 0 71 <1 1568 1267 1043	22 0 69 <1 1560 1268 1166 1337	28 0 69 0 1507 1235 1224 1313
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	20 0 71 <1 1568 1267 1043 1341 3198	22 0 69 <1 1560 1268 1166 1337 4061	28 0 69 0 1507 1235 1224 1313 3622
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 0 71 <1 1568 1267 1043 1341 3198 current	22 0 69 <1 1560 1268 1166 1337 4061 history1	28 0 69 0 1507 1235 1224 1313 3622 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	20 0 71 <1 1568 1267 1043 1341 3198 current	22 0 69 <1 1560 1268 1166 1337 4061 history1	28 0 69 0 1507 1235 1224 1313 3622 history2
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 0 71 <1 1568 1267 1043 1341 3198 current 4	22 0 69 <1 1560 1268 1166 1337 4061 history1 5 2	28 0 69 0 1507 1235 1224 1313 3622 history2 5 0
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	20 0 71 <1 1568 1267 1043 1341 3198 current 4 6 1	22 0 69 <1 1560 1268 1166 1337 4061 history1 5 2	28 0 69 0 1507 1235 1224 1313 3622 history2 5 0 3
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	20 0 71 <1 1568 1267 1043 1341 3198 current 4 6 1 NEG	22 0 69 <1 1560 1268 1166 1337 4061 history1 5 2 2 NEG	28 0 69 0 1507 1235 1224 1313 3622 history2 5 0 3 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 limit/base	20 0 71 <1 1568 1267 1043 1341 3198 current 4 6 1 NEG	22 0 69 <1 1560 1268 1166 1337 4061 history1 5 2 2 NEG	28 0 69 0 1507 1235 1224 1313 3622 history2 5 0 3 NEG
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 D6304 method *ASTM D7844	250 10 100 450 3000 1150 1350 4250 limit/base >20 >158 >20 >0.1 limit/base	20 0 71 <1 1568 1267 1043 1341 3198 current 4 6 1 NEG current 0.2	22 0 69 <1 1560 1268 1166 1337 4061 history1 5 2 2 NEG history1 0.2	28 0 69 0 1507 1235 1224 1313 3622 history2 5 0 3 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 D6304 method *ASTM D7844 *ASTM D7844	250 10 100 450 3000 1150 1350 4250 limit/base >20 >158 >20 >0.1 limit/base	20 0 71 <1 1568 1267 1043 1341 3198 current 4 6 1 NEG current 0.2 10.0	22 0 69 <1 1560 1268 1166 1337 4061 history1 5 2 2 NEG history1 0.2 9.3	28 0 69 0 1507 1235 1224 1313 3622 history2 5 0 3 NEG history2 0.1 7.4
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	250 10 100 450 3000 1150 1350 4250 limit/base >20 >158 >20 >0.1 limit/base	20 0 71 <1 1568 1267 1043 1341 3198 current 4 6 1 NEG current 0.2 10.0 22.3	22 0 69 <1 1560 1268 1166 1337 4061 history1 5 2 2 NEG history1 0.2 9.3 21.6	28 0 69 0 1507 1235 1224 1313 3622 history2 5 0 3 NEG history2 0.1 7.4 19.4
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 >158 >20 >0.1 limit/base	20 0 71 <1 1568 1267 1043 1341 3198 current 4 6 1 NEG current 0.2 10.0 22.3 current	22 0 69 <1 1560 1268 1166 1337 4061 history1 5 2 2 NEG history1 0.2 9.3 21.6 history1	28 0 69 0 1507 1235 1224 1313 3622 history2 5 0 3 NEG history2 0.1 7.4 19.4 history2



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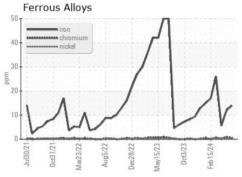


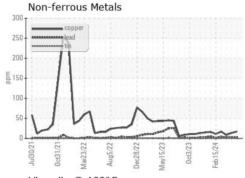


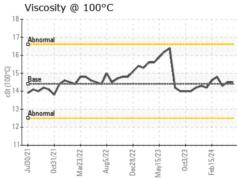
VISUAL		method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual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

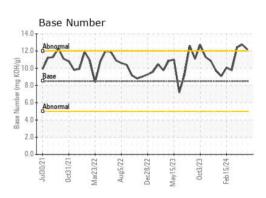
FLUID PROPERTIES		metnoa	ilmit/base	current	nistory i	nistory2
Visc @ 100°C	cSt	ASTM D445	14.4	14.5	14.5	14.3

GRAPHS













Certificate 12367

Laboratory Sample No.

: WC0735181 Lab Number : 06210345 Unique Number : 11083209

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

: 14 Jun 2024 : 18 Jun 2024 Diagnosed : 18 Jun 2024 - Don Baldridge Test Package : IND 2 (Additional Tests: KF)

101 12TH ST CATLETTSBURG, KY US 41169 Contact: CORY GUMBERT

MARATHON PETROLEUM CO.

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

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)

Submitted By: M/V MARTINSVILLE

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