

OIL ANALYSIS REPORT

Texas City [Texas City] Oil - Starboard Main Engine Component

Starboard Main Engine

DIESEL ENGINE OIL SAE 15W40 (150 GAL)

DIAGNOSIS

Recommendation

Resample at the next service interval to monitor. (Customer Sample Comment: Top Up Amount: 15 GAL Top Up Amount: 15 GAL)

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.

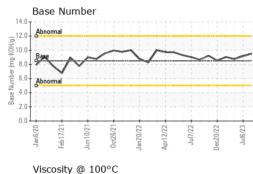


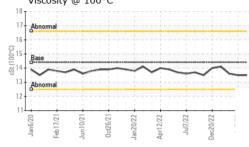
Sample Rating Trend

SAMPLE INFORM	IATION	method	limit/base	current	history1	history2
Sample Number		Client Info		WC0735758	WC0735715	WC0719426
Sample Date		Client Info		21 Oct 2023	06 Jul 2023	15 Feb 2023
Machine Age	hrs	Client Info		17037	16256	14920
Oil Age	hrs	Client Info		366	1322	14920
Oil Changed		Client Info		Oil Added	Oil Added	Oil Added
Sample Status				NORMAL	NORMAL	NORMAL
CONTAMINATION	J	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	7	12	7
Chromium	ppm	ASTM D5185m	>8	<1	<1	<1
Nickel	ppm	ASTM D5185m	>2	<1	0	0
Titanium	ppm	ASTM D5185m	>3	<1	<1	<1
Silver	ppm	ASTM D5185m	>2	0	0	0
Aluminum	ppm	ASTM D5185m	>15	1	0	<1
Lead	ppm	ASTM D5185m	>18	2	4	4
Copper	ppm	ASTM D5185m	>80	<1	<1	<1
Tin	ppm	ASTM D5185m	>14	0	<1	0
Vanadium	ppm	ASTM D5185m		0	0	0
Cadmium	ppm	ASTM D5185m		<1	0	0
ADDITIVES		method	limit/base	current	history1	history2
ADDITIVES Boron	ppm	method ASTM D5185m	limit/base 250	current 60	history1 126	history2 184
Boron Barium	ppm ppm					
Boron		ASTM D5185m	250	60 2 52	126	184 0 24
Boron Barium	ppm	ASTM D5185m ASTM D5185m	250 10	60 2	126 0	184 0 24 <1
Boron Barium Molybdenum Manganese Magnesium	ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100 450	60 2 52 0 318	126 0 31 <1 479	184 0 24 <1 233
Boron Barium Molybdenum Manganese Magnesium Calcium	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100	60 2 52 0 318 1840	126 0 31 <1	184 0 24 <1 233 1898
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus	ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	250 10 100 450 3000 1150	60 2 52 0 318 1840 876	126 0 31 <1 479 2075 1009	184 0 24 <1 233 1898 886
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	250 10 100 450 3000 1150 1350	60 2 52 0 318 1840 876 1059	126 0 31 <1 479 2075 1009 1283	184 0 24 <1 233 1898 886 1044
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	250 10 100 450 3000 1150	60 2 52 0 318 1840 876	126 0 31 <1 479 2075 1009	184 0 24 <1 233 1898 886
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc	ppm 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 1350	60 2 52 0 318 1840 876 1059	126 0 31 <1 479 2075 1009 1283	184 0 24 <1 233 1898 886 1044
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur	ppm 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 4250	60 2 52 0 318 1840 876 1059 3220	126 0 31 <1 479 2075 1009 1283 4255	184 0 24 <1 233 1898 886 1044 3157
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	250 10 100 450 3000 1150 1350 4250	60 2 52 0 318 1840 876 1059 3220 current	126 0 31 <1 479 2075 1009 1283 4255 history1 3 2	184 0 24 <1 233 1898 886 1044 3157 history2 2 1
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon	ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m method	250 10 100 450 3000 1150 1350 4250 limit/base >20	60 2 52 0 318 1840 876 1059 3220 current 3	126 0 31 <1 479 2075 1009 1283 4255 history1 3	184 0 24 <1 233 1898 886 1044 3157 history2 2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium	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 limit/base >20 >158	60 2 52 0 318 1840 876 1059 3220 current 3 2	126 0 31 <1 479 2075 1009 1283 4255 history1 3 2	184 0 24 <1 233 1898 886 1044 3157 history2 2 1
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium	ppm	ASTM D5185m ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >20 >158 >20	60 2 52 0 318 1840 876 1059 3220 current 3 2 4	126 0 31 <1 479 2075 1009 1283 4255 history1 3 2 5	184 0 24 <1 233 1898 886 1044 3157 history2 2 1 5
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >20 >158 >20	60 2 52 0 318 1840 876 1059 3220 current 3 2 4 current	126 0 31 <1 479 2075 1009 1283 4255 history1 3 2 5 5	184 0 24 <1 233 1898 886 1044 3157 history2 2 1 5 5 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot %	ppm	ASTM D5185m ASTM D5185m	250 10 100 450 3000 1150 1350 4250 limit/base >20 >158 >20 limit/base	60 2 52 0 318 1840 876 1059 3220 current 3 2 4 current 0.2	126 0 31 <1 479 2075 1009 1283 4255 history1 3 2 5 5 history1 0.3	184 0 24 <1 233 1898 886 1044 3157 history2 2 1 5 history2 0.2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot % Nitration	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	250 10 100 450 3000 1150 1350 4250 Iimit/base >20 >158 >20 Iimit/base	60 2 52 0 318 1840 876 1059 3220 current 3 2 4 current 0.2 6.4	126 0 31 <1 479 2075 1009 1283 4255 history1 3 2 5 <u>history1</u> 0.3 8.4	184 0 24 <1 233 1898 886 1044 3157 history2 2 1 5 history2 0.2 6.6
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 ASTM D5185m	250 10 100 450 3000 1150 1350 4250 imit/base >20 imit/base >20 imit/base	60 2 52 0 318 1840 876 1059 3220 current 3 2 4 current 0.2 6.4 18.0	126 0 31 <1 479 2075 1009 1283 4255 history1 3 2 5 5 history1 0.3 8.4 19.8	184 0 24 <1 233 1898 886 1044 3157 history2 2 1 5 5 history2 0.2 6.6 20.1
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 ASTM D7844 *ASTM D7624	250 10 100 450 3000 1150 1350 4250 imit/base >20 >158 >20 >158 >20 imit/base 30 imit/base >20 >20 >30	60 2 52 0 318 1840 876 1059 3220 current 3 2 4 current 0.2 6.4 18.0	126 0 31 <1 479 2075 1009 1283 4255 history1 3 2 5 history1 0.3 8.4 19.8 history1	184 0 24 <1 233 1898 886 1044 3157 history2 2 1 5 history2 0.2 6.6 20.1 history2

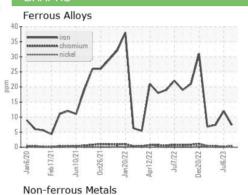


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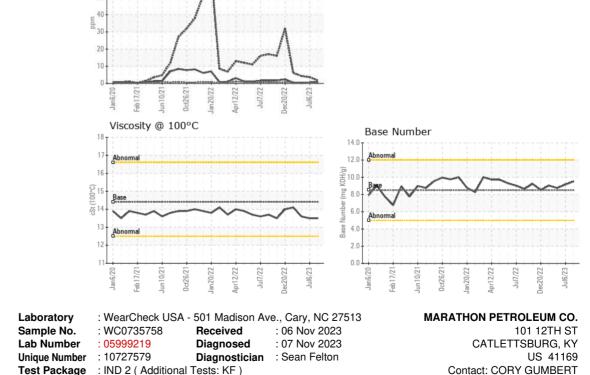
VISUAL		method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual	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 PROPERT	IES	method	limit/base	current	history1	history2
Visc @ 100°C	cSt	ASTM D445	14.4	13.5	13.5	13.6
GRAPHS						



70 60

50

lead





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



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