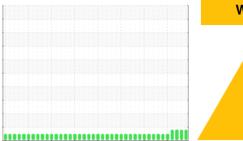


OIL ANALYSIS REPORT

Sample Rating Trend







Canton Machine Id [Canton] Oil - Starboard Main Engine Starboard Main Engine Fluid DIESEL ENGINE OIL SAE 15W40 (150 GAL)

DIAGNOSIS

Recommendation

No corrective action is recommended at this time. Resample at the next service interval to monitor. (
Customer Sample Comment:

Top Up Amount: 30 GAL)

Wear

The lead level is abnormal. All other component wear rates are normal.

Contamination

There is no indication of any contamination in the oil

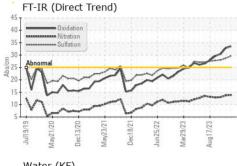
Fluid Condition

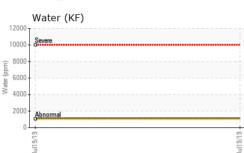
The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.

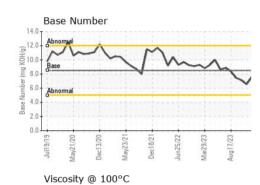
Sample Number Client Info WC0805424 WC0805432 WC0805432 WC0805432 CV0805428 CV0805428 CV0805428 CV0805428 CV0805432 CV0805428 CV0905428	SAMPLE INFORMA	ATION	method	limit/base	current	history1	history2
Sample Date	Sample Number		Client Info		WC0805424	WC0805432	WC0805428
Machine Age hrs Client Info 16437 0 15367 Oil Age hrs Client Info 16437 0 15367 Oil Changed Client Info Oil Added N/A Oil Added Sample Status BANORMAL ABNORMAL ABNORMAL ABNORMAL ABNORMAL CONTAMINATION method limit/base current history1 history2 Fuel WC Method >4.0 <1.0 <1.0 <1.0 <1.0 Glycol WC Method WC Method NEG NEG NEG NEG WEAR METALS method limit/base current history1 history2 Iron ppm ASTM 05185m >8 <1 0 <1 Nickel ppm ASTM 05185m >2 0 0 0 Chromium ppm ASTM 05185m >2 0 0 0 Maluminum ppm ASTM 05185m >2 0 0 0			Client Info		28 Mar 2024	27 Feb 2024	
Oil Age hrs Client Info 16437 0 15367 Oil Changed Client Info Oil Added N/A Oil Added Sample Status Client Info Oil Added N/A Oil Added Fuel WC Method >4.0 <1.0 <1.0 <1.0 Glycol WC Method >4.0 <1.0 <1.0 <1.0 WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >75 56 55 51 Chromium ppm ASTM D5185m >8 <1 0 <1 Nickel ppm ASTM D5185m >8 <1 0 <1 Silver ppm ASTM D5185m >2 0 0 <1 Silver ppm ASTM D5185m >18 25 19 18 Copper ppm ASTM D5185m >80 5 6 6 Tin ppm		hrs			16437	0	15367
Oil Changed Sample Status Client Info Oil Added ABNORMAL CONTAMINATION Current history1 history2 history2							
ABNORMAL ABNORMAL ABNORMAL ABNORMAL ABNORMAL CONTAMINATION method limit/base current history1 history2							
Fuel	-						
WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >75 56 55 51 Chromium ppm ASTM D5185m >8 <1	CONTAMINATION		method	limit/base	current	history1	history2
WEAR METALS	Fuel		WC Method	>4.0	<1.0	<1.0	<1.0
Iron	Glycol		WC Method		NEG	NEG	NEG
Chromium ppm ASTM D5185m >8 <1 0 <1 Nickel ppm ASTM D5185m >2 0 0 0 Titanium ppm ASTM D5185m >2 0 0 <1	WEAR METALS		method	limit/base	current	history1	history2
Nickel	Iron	ppm	ASTM D5185m	>75	56	55	51
Titanium ppm ASTM D5185m >3 0 0 <1 Silver ppm ASTM D5185m >2 0 0 0 Aluminum ppm ASTM D5185m >15 3 1 2 Lead ppm ASTM D5185m >18 25 19 18 Copper ppm ASTM D5185m >80 5 6 6 Tin ppm ASTM D5185m >14 2 0 0 Vanadium ppm ASTM D5185m 0 0 0 0 Cadmium ppm ASTM D5185m 0 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 0 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 10 0 0 0 <td>Chromium</td> <td>ppm</td> <td>ASTM D5185m</td> <td>>8</td> <td><1</td> <td>0</td> <td><1</td>	Chromium	ppm	ASTM D5185m	>8	<1	0	<1
Titanium ppm ASTM D5185m >3 0 0 <1 Silver ppm ASTM D5185m >2 0 0 0 Aluminum ppm ASTM D5185m >15 3 1 2 Lead ppm ASTM D5185m >18 25 19 18 Copper ppm ASTM D5185m >80 5 6 6 Tin ppm ASTM D5185m >14 2 0 <1	Nickel	ppm	ASTM D5185m	>2	0	0	0
Silver ppm ASTM D5185m >2 0 0 0 Aluminum ppm ASTM D5185m >15 3 1 2 Lead ppm ASTM D5185m >18 25 ▲ 19 ▲ 18 Copper ppm ASTM D5185m >80 5 6 6 Tin ppm ASTM D5185m >14 2 0 <1 Vanadium ppm ASTM D5185m 0 0 0 0 Cadmium ppm ASTM D5185m 0 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 250 106 86 97 Barium ppm ASTM D5185m 10 0 0 0 Magnesium ppm ASTM D5185m 100 112 102 108 Calcium ppm ASTM D5185m 450 994 1049 </td <td></td> <td></td> <td>ASTM D5185m</td> <td>>3</td> <td>0</td> <td>0</td> <td><1</td>			ASTM D5185m	>3	0	0	<1
Aluminum ppm ASTM D5185m >15 3 1 2 Lead ppm ASTM D5185m >18 25 ▲ 19 ▲ 18 Copper ppm ASTM D5185m >80 5 6 6 Tin ppm ASTM D5185m >14 2 0 <1 Vanadium ppm ASTM D5185m 0 0 0 0 Cadmium ppm ASTM D5185m 0 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 0 0 0 0 Barium ppm ASTM D5185m 100 112 102 108 Barium ppm ASTM D5185m 100 112 102 108 Manganesium ppm ASTM D5185m 450 994 1049 1028 Calcium ppm ASTM D5185m 450 994			ASTM D5185m	>2	0	0	
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Copper ppm ASTM D5185m >80 5 6 6 Tin ppm ASTM D5185m >14 2 0 <1				>18	<u>^</u> 25	<u> 19</u>	<u> 18</u>
Tin				>80	5	6	6
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Magnesium ppm ASTM D5185m 450 994 1049 1028 Calcium ppm ASTM D5185m 3000 1495 1512 1482 Phosphorus ppm ASTM D5185m 1150 890 807 913 Zinc ppm ASTM D5185m 1350 1110 1061 1133 Sulfur ppm ASTM D5185m 4250 3106 3162 2829 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 6 8 5 Sodium ppm ASTM D5185m >158 4 1 3 Potassium ppm ASTM D5185m >20 <1	Barium	ppm	ASTM D5185m	10	0	0	0
Calcium ppm ASTM D5185m 3000 1495 1512 1482 Phosphorus ppm ASTM D5185m 1150 890 807 913 Zinc ppm ASTM D5185m 1350 1110 1061 1133 Sulfur ppm ASTM D5185m 4250 3106 3162 2829 CONTAMINANTS method limit/base current history1 history2 CONTAMINANTS method limit/base current history1 history2 Solium ppm ASTM D5185m >20 6 8 5 Sodium ppm ASTM D5185m >158 4 1 3 Potassium ppm ASTM D5185m >20 <1	Barium Molybdenum	ppm ppm	ASTM D5185m ASTM D5185m	10	0 112	0 102	0
Phosphorus ppm ASTM D5185m 1150 890 807 913 Zinc ppm ASTM D5185m 1350 1110 1061 1133 Sulfur ppm ASTM D5185m 4250 3106 3162 2829 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 6 8 5 Sodium ppm ASTM D5185m >158 4 1 3 Potassium ppm ASTM D5185m >20 <1	Barium Molybdenum Manganese	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m	100	0 112 <1	0 102 0	0 108 <1
Zinc ppm ASTM D5185m 1350 1110 1061 1133 Sulfur ppm ASTM D5185m 4250 3106 3162 2829 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 6 8 5 Sodium ppm ASTM D5185m >158 4 1 3 Potassium ppm ASTM D5185m >20 <1	Barium Molybdenum Manganese Magnesium	ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	10 100 450	0 112 <1 994	0 102 0 1049	0 108 <1 1028
Sulfur ppm ASTM D5185m 4250 3106 3162 2829 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 6 8 5 Sodium ppm ASTM D5185m >158 4 1 3 Potassium ppm ASTM D5185m >20 <1	Barium Molybdenum Manganese Magnesium Calcium	ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	10 100 450 3000	0 112 <1 994 1495	0 102 0 1049 1512	0 108 <1 1028 1482
CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 6 8 5 Sodium ppm ASTM D5185m >158 4 1 3 Potassium ppm ASTM D5185m >20 <1	Barium Molybdenum Manganese Magnesium Calcium Phosphorus	ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	10 100 450 3000 1150	0 112 <1 994 1495 890	0 102 0 1049 1512 807	0 108 <1 1028 1482 913
Silicon ppm ASTM D5185m >20 6 8 5 Sodium ppm ASTM D5185m >158 4 1 3 Potassium ppm ASTM D5185m >20 <1 0 0 Water % ASTM D6304 >0.1 NEG NEG NEG INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0.6 0.6 0.5 Nitration Abs/cm *ASTM D7624 >20 13.9 13.7 13.0 Sulfation Abs/.1mm *ASTM D7415 >30 29.6 28.7 28.0 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 33.5 32.8 30.4	Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc	ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	10 100 450 3000 1150 1350	0 112 <1 994 1495 890 1110	0 102 0 1049 1512 807 1061	0 108 <1 1028 1482 913 1133
Sodium ppm ASTM D5185m >158 4 1 3 Potassium ppm ASTM D5185m >20 <1 0 0 Water % ASTM D6304 >0.1 NEG NEG NEG INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0.6 0.6 0.6 0.5 Nitration Abs/cm *ASTM D7624 >20 13.9 13.7 13.0 Sulfation Abs/.1mm *ASTM D7415 >30 29.6 28.7 28.0 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 33.5 32.8 30.4	Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc	ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	10 100 450 3000 1150 1350	0 112 <1 994 1495 890 1110	0 102 0 1049 1512 807 1061	0 108 <1 1028 1482 913 1133
Potassium ppm ASTM D5185m >20 <1 0 0 Water % ASTM D6304 >0.1 NEG NEG NEG INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0.6 0.6 0.5 Nitration Abs/cm *ASTM D7624 >20 13.9 13.7 13.0 Sulfation Abs/.1mm *ASTM D7415 >30 29.6 28.7 28.0 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 33.5 32.8 30.4	Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur	ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	10 100 450 3000 1150 1350 4250	0 112 <1 994 1495 890 1110 3106	0 102 0 1049 1512 807 1061 3162	0 108 <1 1028 1482 913 1133 2829
Water % ASTM D6304 >0.1 NEG NEG NEG INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0.6 0.6 0.5 Nitration Abs/cm *ASTM D7624 >20 13.9 13.7 13.0 Sulfation Abs/.1mm *ASTM D7415 >30 29.6 28.7 28.0 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 33.5 32.8 30.4	Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS	ppm 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	10 100 450 3000 1150 1350 4250	0 112 <1 994 1495 890 1110 3106	0 102 0 1049 1512 807 1061 3162 history1	0 108 <1 1028 1482 913 1133 2829 history2
INFRA-RED	Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	10 100 450 3000 1150 1350 4250 limit/base >20	0 112 <1 994 1495 890 1110 3106 current	0 102 0 1049 1512 807 1061 3162 history1	0 108 <1 1028 1482 913 1133 2829 history2
Soot % % *ASTM D7844 0.6 0.6 0.5 Nitration Abs/cm *ASTM D7624 >20 13.9 13.7 13.0 Sulfation Abs/.1mm *ASTM D7415 >30 29.6 28.7 28.0 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 33.5 32.8 30.4	Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium	ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	10 100 450 3000 1150 1350 4250 limit/base >20 >158 >20	0 112 <1 994 1495 890 1110 3106 current 6	0 102 0 1049 1512 807 1061 3162 history1 8	0 108 <1 1028 1482 913 1133 2829 history2 5
Nitration Abs/cm *ASTM D7624 >20 13.9 13.7 13.0 Sulfation Abs/.1mm *ASTM D7415 >30 29.6 28.7 28.0 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 33.5 32.8 30.4	Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium	ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	10 100 450 3000 1150 1350 4250 limit/base >20 >158 >20	0 112 <1 994 1495 890 1110 3106 current 6 4	0 102 0 1049 1512 807 1061 3162 history1 8	0 108 <1 1028 1482 913 1133 2829 history2 5
Sulfation Abs/.1mm *ASTM D7415 >30 29.6 28.7 28.0 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 33.5 32.8 30.4	Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Water	ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	10 100 450 3000 1150 1350 4250 limit/base >20 >158 >20 >0.1	0 112 <1 994 1495 890 1110 3106 current 6 4 <1	0 102 0 1049 1512 807 1061 3162 history1 8 1 0	0 108 <1 1028 1482 913 1133 2829 history2 5 3 0 NEG
Sulfation Abs/.1mm *ASTM D7415 >30 29.6 28.7 28.0 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 33.5 32.8 30.4	Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Water INFRA-RED	ppm	ASTM D5185m ASTM D6304	10 100 450 3000 1150 1350 4250 limit/base >20 >158 >20 >0.1	0 112 <1 994 1495 890 1110 3106 current 6 4 <1 NEG current	0 102 0 1049 1512 807 1061 3162 history1 8 1 0 NEG	0 108 <1 1028 1482 913 1133 2829 history2 5 3 0 NEG
Oxidation Abs/.1mm *ASTM D7414 >25 33.5 32.8 30.4	Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Water INFRA-RED Soot %	ppm	ASTM D5185m ASTM D6304 method *ASTM D7844	10 100 450 3000 1150 1350 4250 limit/base >20 >158 >20 >0.1 limit/base	0 112 <1 994 1495 890 1110 3106 current 6 4 <1 NEG current 0.6	0 102 0 1049 1512 807 1061 3162 history1 8 1 0 NEG history1	0 108 <1 1028 1482 913 1133 2829 history2 5 3 0 NEG history2 0.5
	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	10 100 450 3000 1150 1350 4250 limit/base >20 >158 >20 >0.1 limit/base	0 112 <1 994 1495 890 1110 3106 current 6 4 <1 NEG current 0.6 13.9	0 102 0 1049 1512 807 1061 3162 history1 8 1 0 NEG history1 0.6 13.7	0 108 <1 1028 1482 913 1133 2829 history2 5 3 0 NEG history2 0.5 13.0
	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 Method ASTM D5185m ASTM D5185m ASTM D6304 Method *ASTM D7844 *ASTM D7624 *ASTM D7415	10 100 450 3000 1150 1350 4250 limit/base >20 >158 >20 >0.1 limit/base	0 112 <1 994 1495 890 1110 3106 current 6 4 <1 NEG current 0.6 13.9 29.6	0 102 0 1049 1512 807 1061 3162 history1 8 1 0 NEG history1 0.6 13.7 28.7	0 108 <1 1028 1482 913 1133 2829 history2 5 3 0 NEG history2 0.5 13.0 28.0
	Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Water INFRA-RED Soot % Nitration Sulfation FLUID DEGRADAT	ppm	ASTM D5185m ASTM D6304 method *ASTM D7844 *ASTM D7624 *ASTM D7615 method	10 100 450 3000 1150 1350 4250 limit/base >20 >158 >20 >0.1 limit/base >20 >30 limit/base	0 112 <1 994 1495 890 1110 3106 current 6 4 <1 NEG current 0.6 13.9 29.6 current	0 102 0 1049 1512 807 1061 3162 history1 8 1 0 NEG history1 0.6 13.7 28.7	0 108 <1 1028 1482 913 1133 2829 history2 5 3 0 NEG history2 0.5 13.0 28.0 history2

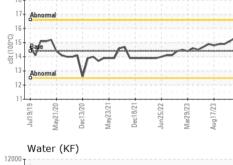


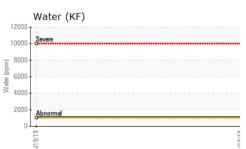
OIL ANALYSIS REPORT







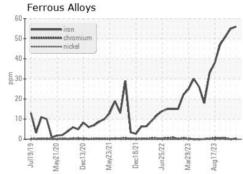


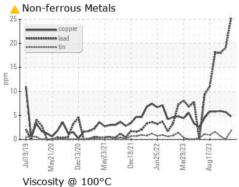


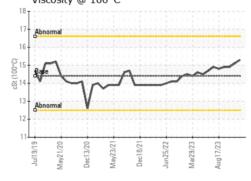
VISUAL		method	limit/base	current	history1	history2
White Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE	NONE
Sand/Dirt	scalar	*Visual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

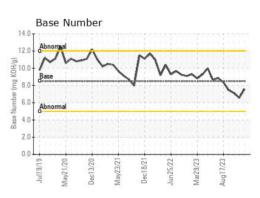
FLUID PROPERTIES		method	limit/base	current	history1	history2
Visc @ 100°C	cSt	ASTM D445	14.4	15.3	15.1	14.9

GRAPHS













Certificate 12367

Laboratory Sample No.

: WC0805424 Lab Number : 06157858

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 Received **Tested** Unique Number : 10993281

: 23 Apr 2024 : 25 Apr 2024 Diagnosed : 25 Apr 2024 - Sean Felton Test Package : IND 2 (Additional Tests: KF)

101 12TH ST CATLETTSBURG, KY US 41169

MARATHON PETROLEUM CO.

Contact: M/V CANTON

mvcanton@marathonpetroleum.com

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)

T:

F: