

OIL ANALYSIS REPORT

Area Garyville [Garyville] Oil - Port Main Engine

Port Main Engine

Fluid SHELL ROTELLA T 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 Rating Trend

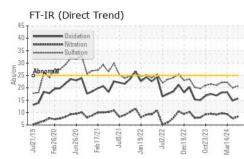


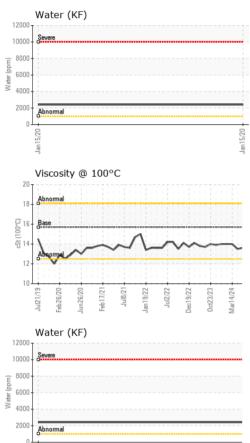
NORMAL

SAMPLE INFORM	IATION	method	limit/base	current	history1	history2
Sample Number		Client Info		WC0874885	WC0874883	WC0859888
Sample Date		Client Info		03 Jun 2024	08 May 2024	14 Mar 2024
Machine Age	hrs	Client Info		4665	13119	12700
Oil Age	hrs	Client Info		4210	269	2750
Oil Changed		Client Info		Filtered	Filtered	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		NEG	NEG	NEG
WEAR METALS		method	limit/base	current	history1	history2
Iron	ppm	ASTM D5185m	>75	20	13	26
Chromium	ppm	ASTM D5185m	>8	1	1	0
Nickel	ppm	ASTM D5185m	>2	<1	<1	0
Titanium	ppm	ASTM D5185m	>3	5	5	3
Silver	ppm	ASTM D5185m	>2	0	1	0
Aluminum	ppm	ASTM D5185m	>15	3	2	0
Lead	ppm	ASTM D5185m	>18	5	6	15
Copper	ppm		>80	7	8	6
Tin		ASTM D5185m	>14	′ <1	<1	0
Vanadium	ppm ppm	ASTM D5185m	>14	<1	<1	0
Cadmium	ppm	ASTM D5185m		<1	<1	0
	ррпп					-
ADDITIVES						
		method	limit/base	current	history1	history2
Boron	ppm	ASTM D5185m	316	212	236	96
Boron Barium	ppm	ASTM D5185m ASTM D5185m	316 0.0	212 0	236 <1	96 0
Boron Barium Molybdenum	ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m	316	212 0 55	236 <1 50	96 0 33
Boron Barium Molybdenum Manganese	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	316 0.0 1.2	212 0 55 <1	236 <1 50 1	96 0 33 0
Boron Barium Molybdenum Manganese Magnesium	ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	316 0.0 1.2 24	212 0 55 <1 575	236 <1 50 1 479	96 0 33 0 606
Boron Barium Molybdenum Manganese Magnesium Calcium	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	316 0.0 1.2 24 2292	212 0 55 <1 575 1662	236 <1 50 1 479 1438	96 0 33 0 606 1702
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus	ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	316 0.0 1.2 24 2292 1064	212 0 55 <1 575 1662 930	236 <1 50 1 479 1438 778	96 0 33 0 606 1702 786
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc	ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	316 0.0 1.2 24 2292 1064 1160	212 0 55 <1 575 1662 930 1117	236 <1 50 1 479 1438 778 921	96 0 33 0 606 1702 786 1005
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	316 0.0 1.2 24 2292 1064	212 0 55 <1 575 1662 930	236 <1 50 1 479 1438 778	96 0 33 0 606 1702 786
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	316 0.0 1.2 24 2292 1064 1160 4996	212 0 55 <1 575 1662 930 1117 3468 current	236 <1 50 1 479 1438 778 921 3067 history1	96 0 33 0 606 1702 786 1005 3498 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon	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 method	316 0.0 1.2 24 2292 1064 1160 4996 limit/base >20	212 0 55 <1 575 1662 930 1117 3468 current 5	236 <1 50 1 479 1438 778 921 3067 history1 6	96 0 33 0 606 1702 786 1005 3498 history2 3
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m method ASTM D5185m	316 0.0 1.2 24 2292 1064 1160 4996 limit/base >20 >75	212 0 55 <1 575 1662 930 1117 3468 <u>current</u> 5 9	236 <1 50 1 479 1438 778 921 3067 history1 6 13	96 0 33 0 606 1702 786 1005 3498 history2 3 <1
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	316 0.0 1.2 24 2292 1064 1160 4996 imit/base >20 >75 >20	212 0 55 <1 575 1662 930 1117 3468 <u>current</u> 5 9 3	236 <1 50 1 479 1438 778 921 3067 history1 6 13 12	96 0 33 0 606 1702 786 1005 3498 history2 3 <1 0
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m method ASTM D5185m	316 0.0 1.2 24 2292 1064 1160 4996 imit/base >20 >75 >20	212 0 55 <1 575 1662 930 1117 3468 <u>current</u> 5 9	236 <1 50 1 479 1438 778 921 3067 history1 6 13	96 0 33 0 606 1702 786 1005 3498 history2 3 <1
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	316 0.0 1.2 24 2292 1064 1160 4996 imit/base >20 >75 >20	212 0 55 <1 575 1662 930 1117 3468 <u>current</u> 5 9 3	236 <1 50 1 479 1438 778 921 3067 history1 6 13 12	96 0 33 0 606 1702 786 1005 3498 history2 3 <1 0
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Water	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	316 0.0 1.2 24 2292 1064 1160 4996 imit/base >20 >75 >20 >75 >20	212 0 55 <1 575 1662 930 1117 3468 <u>current</u> 5 9 3 3 NEG	236 <1 50 1 479 1438 778 921 3067 history1 6 13 12 NEG	96 0 33 0 606 1702 786 1005 3498 history2 3 3 <1 0 NEG history2 0.6
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 D5185m	316 0.0 1.2 24 2292 1064 1160 4996 limit/base >20 >75 >20 >0.1 limit/base	212 0 55 <1 575 1662 930 1117 3468 <i>current</i> 5 9 3 <i>NEG</i>	236 <1 50 1 479 1438 778 921 3067 history1 6 13 12 NEG NEG history1	96 0 33 0 606 1702 786 1005 3498 history2 3 <1 0 NEG history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Vater INFRA-RED Soot %	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	316 0.0 1.2 24 2292 1064 1160 4996 limit/base >20 >75 >20 >0.1 limit/base	212 0 55 <1 575 1662 930 1117 3468 <i>current</i> 5 9 3 NEG <i>current</i> 0.4	236 <1 50 1 479 1438 778 921 3067 history1 6 13 12 NEG history1 0.3	96 0 33 0 606 1702 786 1005 3498 history2 3 3 <1 0 NEG history2 0.6
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 D5185m	316 0.0 1.2 24 2292 1064 1160 4996 <i>limit/base</i> >20 >75 >20 >0.1 <i>limit/base</i>	212 0 55 <1 575 1662 930 1117 3468 <u>current</u> 5 9 3 NEG 0.4 8.4	236 <1 50 1 479 1438 778 921 3067 history1 6 13 12 NEG NEG history1 0.3 7.6	96 0 33 0 606 1702 786 1005 3498 history2 3
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Vater INFRA-RED Soot % Nitration Sulfation	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	316 0.0 1.2 24 2292 1064 1160 4996 Imit/base >20 >75 >20 >0.1 Imit/base >20 >20 >0.2	212 0 55 <1 575 1662 930 1117 3468 <u>current</u> 5 9 3 NEG 0.4 8.4 20.7	236 <1 50 1 479 1438 778 921 3067 history1 6 13 12 NEG history1 0.3 7.6 20.0	96 0 33 0 606 1702 786 1005 3498 history2 3 <1 0 NEG NEG history2 0.6 9.4 22.2
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 D7844 *ASTM D7644	316 0.0 1.2 24 2292 1064 1160 4996 imit/base >20 >75 >20 >0.1 imit/base >20 >30 imit/base >30	212 0 55 <1 575 1662 930 1117 3468 <i>current</i> 5 9 3 NEG 0.4 8.4 20.7	236 <1 50 1 479 1438 778 921 3067 history1 6 13 12 NEG NEG history1 0.3 7.6 20.0 history1	96 0 33 0 606 1702 786 1005 3498 history2 3 <1 0 NEG NEG history2 0.6 9.4 22.2 history2



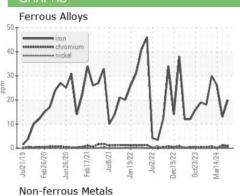
OIL ANALYSIS REPORT

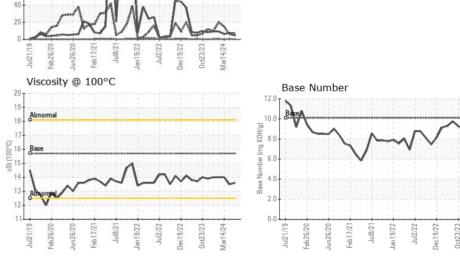




Jan 15/20

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	TIES	method	limit/base	current	history1	history2
Visc @ 100°C	cSt	ASTM D445	15.7	13.6	13.5	14.0
GRAPHS						





Laboratory : WearCheck USA - 501 Madison Ave., Cary, NC 27513 MARATHON PETROLEUM CO. Sample No. : WC0874885 Received : 14 Jun 2024 101 12TH ST Lab Number : 06210363 Tested : 18 Jun 2024 CATLETTSBURG, KY Unique Number : 11083227 Diagnosed : 18 Jun 2024 - Don Baldridge US 41169 Test Package : IND 2 (Additional Tests: KF) Contact: SHAWN MCCLASKEY Certificate 12367 stmcclaskey@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. T: (606)739-2416 F: x:

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

140

120 100

80

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Submitted By: M/V GARYVILLE

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