

OIL ANALYSIS REPORT



Map Runner
[Map Runner] Oil - Forward Genset
Forward Genset

Fluid
DIESEL ENGINE OIL SAE 15W40 (5 GAL)



Sample Rating Trend



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

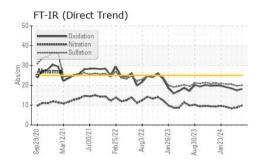
Fluid Condition

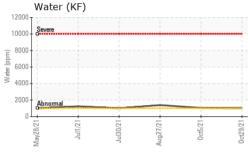
The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.

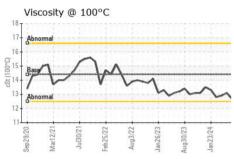
Sample Date Client Info 28 May 2024 22 Apr 2024 20 Mar 2024 Machine Age hrs Client Info 0	SAMPLE INFORM	ATION	method	limit/base	current	history1	history2
Machine Age hrs Client Info 0	Sample Number		Client Info		WC0874535	WC0874627	WC0859925
Oil Age hrs Client Info Changed 294 162 Oil Changed Listory2 Eucled WC Method >4.0 <1.0	Sample Date		Client Info		28 May 2024	22 Apr 2024	20 Mar 2024
Client Info	Machine Age	hrs	Client Info		0	11033	10654
Oil Changed Sample Status Client Info Changed NORMAL NORMAL NORMAL NORMAL NORMAL Changed NORMAL NORMAL NORMAL NORMAL NORMAL NORMAL CONTAMINATION method limit/base current history1 history2 Fuel WC Method NEG NEG NEG WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >50 6 4 4 Chromium ppm ASTM D5185m >50 6 4 4 Chromium ppm ASTM D5185m >2 0 0 <1	Oil Age	hrs	Client Info		0	294	162
NORMAL NORMAL NORMAL NORMAL	Oil Changed		Client Info		Changed	Changed	Changed
Fuel WC Method WC Method NEG NEG NEG NEG	Sample Status				_		
WEAR METALS	CONTAMINATION		method	limit/base	current	history1	history2
WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >50 6 4 4 Chromium ppm ASTM D5185m >4 <1	Fuel		WC Method	>4.0	<1.0	<1.0	<1.0
Iron	Glycol		WC Method		NEG	NEG	NEG
Chromium ppm ASTM D5185m >4 <1 <1 <1 Nickel ppm ASTM D5185m >2 0 0 <1	WEAR METALS		method	limit/base	current	history1	history2
Nickel	Iron	ppm	ASTM D5185m	>50	6	4	4
Description	Chromium	ppm	ASTM D5185m	>4	<1	<1	<1
Silver	Nickel	ppm	ASTM D5185m	>2	0	0	<1
Aluminum	Titanium	ppm	ASTM D5185m		0	<1	<1
Lead	Silver	ppm	ASTM D5185m	>5	0	<1	<1
Copper ppm ASTM D5185m >70 5 1 1 Tin ppm ASTM D5185m >15 0 1 <1			ASTM D5185m	>12	1	3	2
Tin	Lead	ppm	ASTM D5185m	>17	2	3	2
Tin	Copper	ppm	ASTM D5185m	>70	5	1	1
Vanadium ppm ASTM D5185m <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1		ppm	ASTM D5185m	>15	0	1	<1
Cadmium ppm ASTM D5185m 0 <1 <1 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 250 7 14 4 Barium ppm ASTM D5185m 10 0 0 0 Molybdenum ppm ASTM D5185m 100 66 70 64 Manganese ppm ASTM D5185m 100 66 70 64 Magnesium ppm ASTM D5185m 100 1465 1523 1462 Calcium ppm ASTM D5185m 3000 1189 1244 1173 Phosphorus ppm ASTM D5185m 1350 1306 1356 1295 Sulfur ppm ASTM D5185m 1350 1306 1356 1295 Sulfur ppm ASTM D5185m >25 4 6 4 Sodium ppm ASTM D5185m >158 <			ASTM D5185m		<1	<1	<1
Boron			ASTM D5185m		0	<1	<1
Barium ppm ASTM D5185m 10 0 0 0 Molybdenum ppm ASTM D5185m 100 66 70 64 Manganese ppm ASTM D5185m 100 <1	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum ppm ASTM D5185m 100 66 70 64 Manganese ppm ASTM D5185m < 1 0 <1 Magnesium ppm ASTM D5185m 450 1465 1523 1462 Calcium ppm ASTM D5185m 3000 1189 1244 1173 Phosphorus ppm ASTM D5185m 3000 1189 1244 1173 Phosphorus ppm ASTM D5185m 3000 1189 1244 1173 Phosphorus ppm ASTM D5185m 150 1098 1218 1150 Zinc ppm ASTM D5185m 1350 1306 1356 1295 Sulfur ppm ASTM D5185m 4250 3794 3585 3726 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 4 6 4 Sodium ppm ASTM D5185m <td></td> <td></td> <td></td> <td></td> <th></th> <td></td> <td></td>							
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Magnesium ppm ASTM D5185m 450 1465 1523 1462 Calcium ppm ASTM D5185m 3000 1189 1244 1173 Phosphorus ppm ASTM D5185m 1150 1098 1218 1150 Zinc ppm ASTM D5185m 1350 1306 1356 1295 Sulfur ppm ASTM D5185m 4250 3794 3585 3726 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 4 6 4 Sodium ppm ASTM D5185m >158 <1 0 <1 Potassium ppm ASTM D5185m >20 1 3 2 Water % ASTM D6304 >0.1 NEG NEG NEG INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844							
Calcium ppm ASTM D5185m 3000 1189 1244 1173 Phosphorus ppm ASTM D5185m 1150 1098 1218 1150 Zinc ppm ASTM D5185m 1350 1306 1356 1295 Sulfur ppm ASTM D5185m 4250 3794 3585 3726 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 4 6 4 Sodium ppm ASTM D5185m >158 <1	Barium	ppm	ASTM D5185m	10	0	0	0
Phosphorus ppm ASTM D5185m 1150 1098 1218 1150 Zinc ppm ASTM D5185m 1350 1306 1356 1295 Sulfur ppm ASTM D5185m 4250 3794 3585 3726 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 4 6 4 Sodium ppm ASTM D5185m >158 <1	Barium Molybdenum	ppm ppm	ASTM D5185m ASTM D5185m	10	0 66	0 70	0
Zinc ppm ASTM D5185m 1350 1306 1356 1295 Sulfur ppm ASTM D5185m 4250 3794 3585 3726 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 4 6 4 Sodium ppm ASTM D5185m >158 <1	Barium Molybdenum Manganese	ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m	100	0 66 <1	0 70 0	0 64 <1
Sulfur ppm ASTM D5185m 4250 3794 3585 3726 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 4 6 4 Sodium ppm ASTM D5185m >158 <1	Barium Molybdenum Manganese Magnesium	ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	10 100 450	0 66 <1 1465	0 70 0 1523	0 64 <1 1462
CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 4 6 4 Sodium ppm ASTM D5185m >158 <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 66 <1 1465 1189	0 70 0 1523 1244	0 64 <1 1462 1173
Silicon ppm ASTM D5185m >25 4 6 4 Sodium ppm ASTM D5185m >158 <1 0 <1 Potassium ppm ASTM D5185m >20 1 3 2 Water % ASTM D6304 >0.1 NEG NEG NEG INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0.1 0.1 0.1 0.1 Nitration Abs/cm *ASTM D7624 >20 9.8 8.8 8.4 Sulfation Abs/.1mm *ASTM D7415 >30 20.0 19.7 20.5 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 18.2 17.4 18.5	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 66 <1 1465 1189 1098	0 70 0 1523 1244 1218	0 64 <1 1462 1173 1150
Sodium ppm ASTM D5185m >158 <1 0 <1 Potassium ppm ASTM D5185m >20 1 3 2 Water % ASTM D6304 >0.1 NEG NEG NEG INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0.1 0.1 0.1 Nitration Abs/cm *ASTM D7624 >20 9.8 8.8 8.4 Sulfation Abs/.1mm *ASTM D7415 >30 20.0 19.7 20.5 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 18.2 17.4 18.5	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 66 <1 1465 1189 1098 1306	0 70 0 1523 1244 1218 1356	0 64 <1 1462 1173 1150 1295
Potassium ppm ASTM D5185m >20 1 3 2 Water % ASTM D6304 >0.1 NEG NEG NEG INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0.1 0.1 0.1 0.1 Nitration Abs/cm *ASTM D7624 >20 9.8 8.8 8.4 Sulfation Abs/.1mm *ASTM D7415 >30 20.0 19.7 20.5 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 18.2 17.4 18.5	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 66 <1 1465 1189 1098 1306 3794	0 70 0 1523 1244 1218 1356 3585	0 64 <1 1462 1173 1150 1295 3726
Water % ASTM D6304 >0.1 NEG NEG NEG INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0.1 0.1 0.1 Nitration Abs/cm *ASTM D7624 >20 9.8 8.8 8.4 Sulfation Abs/.1mm *ASTM D7415 >30 20.0 19.7 20.5 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 18.2 17.4 18.5	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 66 <1 1465 1189 1098 1306 3794 current	0 70 0 1523 1244 1218 1356 3585 history1	0 64 <1 1462 1173 1150 1295 3726 history2
INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0.1 0.1 0.1 Nitration Abs/cm *ASTM D7624 >20 9.8 8.8 8.4 Sulfation Abs/.1mm *ASTM D7415 >30 20.0 19.7 20.5 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 18.2 17.4 18.5	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 >25	0 66 <1 1465 1189 1098 1306 3794 current	0 70 0 1523 1244 1218 1356 3585 history1	0 64 <1 1462 1173 1150 1295 3726 history2
Soot % % *ASTM D7844 0.1 0.1 0.1 Nitration Abs/cm *ASTM D7624 >20 9.8 8.8 8.4 Sulfation Abs/.1mm *ASTM D7415 >30 20.0 19.7 20.5 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 18.2 17.4 18.5	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 >25 >158	0 66 <1 1465 1189 1098 1306 3794 current 4	0 70 0 1523 1244 1218 1356 3585 history1 6	0 64 <1 1462 1173 1150 1295 3726 history2 4
Nitration Abs/cm *ASTM D7624 >20 9.8 8.8 8.4 Sulfation Abs/.1mm *ASTM D7415 >30 20.0 19.7 20.5 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 18.2 17.4 18.5	Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium	ppm	ASTM D5185m	10 100 450 3000 1150 1350 4250 limit/base >25 >158 >20	0 66 <1 1465 1189 1098 1306 3794 current 4 <1	0 70 0 1523 1244 1218 1356 3585 history1 6 0 3	0 64 <1 1462 1173 1150 1295 3726 history2 4 <1
Nitration Abs/cm *ASTM D7624 >20 9.8 8.8 8.4 Sulfation Abs/.1mm *ASTM D7415 >30 20.0 19.7 20.5 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 18.2 17.4 18.5	Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Water	ppm	ASTM D5185m	10 100 450 3000 1150 1350 4250 limit/base >25 >158 >20 >0.1	0 66 <1 1465 1189 1098 1306 3794 current 4 <1 1	0 70 0 1523 1244 1218 1356 3585 history1 6 0 3 NEG	0 64 <1 1462 1173 1150 1295 3726 history2 4 <1
Sulfation Abs/.1mm *ASTM D7415 >30 20.0 19.7 20.5 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 18.2 17.4 18.5	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 >25 >158 >20 >0.1	0 66 <1 1465 1189 1098 1306 3794 current 4 <1 1 NEG	0 70 0 1523 1244 1218 1356 3585 history1 6 0 3 NEG	0 64 <1 1462 1173 1150 1295 3726 history2 4 <1 2 NEG
Oxidation Abs/.1mm *ASTM D7414 >25 18.2 17.4 18.5	Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Water INFRA-RED Soot %	ppm	ASTM D5185m ASTM D6304	10 100 450 3000 1150 1350 4250 limit/base >25 >158 >20 >0.1 limit/base	0 66 <1 1465 1189 1098 1306 3794 current 4 <1 1 NEG current	0 70 0 1523 1244 1218 1356 3585 history1 6 0 3 NEG history1 0.1	0 64 <1 1462 1173 1150 1295 3726 history2 4 <1 2 NEG history2
	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 D7624	10 100 450 3000 1150 1350 4250 limit/base >25 >158 >20 >0.1 limit/base	0 66 <1 1465 1189 1098 1306 3794 current 4 <1 1 NEG current 0.1 9.8	0 70 0 1523 1244 1218 1356 3585 history1 6 0 3 NEG history1 0.1 8.8	0 64 <1 1462 1173 1150 1295 3726 history2 4 <1 2 NEG history2 0.1 8.4
	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 D7415	10 100 450 3000 1150 1350 4250 limit/base >25 >158 >20 >0.1 limit/base	0 66 <1 1465 1189 1098 1306 3794 current 4 <1 1 NEG current 0.1 9.8 20.0	0 70 0 1523 1244 1218 1356 3585 history1 6 0 3 NEG history1 0.1 8.8 19.7	0 64 <1 1462 1173 1150 1295 3726 history2 4 <1 2 NEG history2 0.1 8.4 20.5
	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 D7624 *ASTM D7415 method	10 100 450 3000 1150 1350 4250 limit/base >25 >158 >20 >0.1 limit/base >20 >30 limit/base	0 66 <1 1465 1189 1098 1306 3794 current 4 <1 1 NEG current 0.1 9.8 20.0 current	0 70 0 1523 1244 1218 1356 3585 history1 6 0 3 NEG history1 0.1 8.8 19.7 history1	0 64 <1 1462 1173 1150 1295 3726 history2 4 <1 2 NEG history2 0.1 8.4 20.5 history2

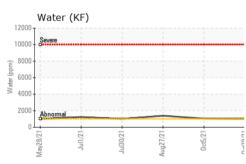


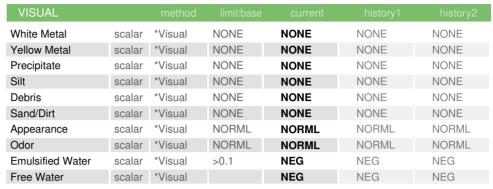
OIL ANALYSIS REPORT





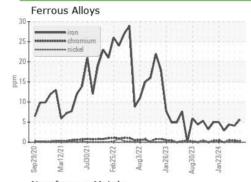


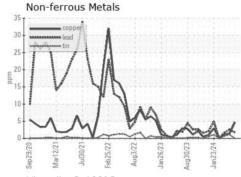


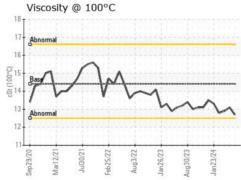


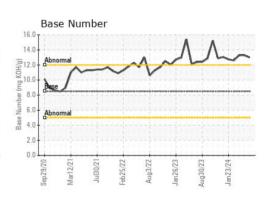
FLUID PROPER	TIES	method				history2
Visc @ 100°C	cSt	ASTM D445	14.4	12.7	13.1	12.9

GRAPHS













Laboratory Sample No.

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 : WC0874535 Lab Number : 06202973 Unique Number : 11070434

Received **Tested** Diagnosed

: 07 Jun 2024 : 11 Jun 2024

: 11 Jun 2024 - Sean Felton

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

MARATHON PETROLEUM CO.

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

Test Package : IND 2 (Additional Tests: KF) Certificate 12367 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)