

OIL ANALYSIS REPORT

Sample Rating Trend







Map Runner [Map Runner] Oil - Port Main Engine Port Main Engine

DIESEL ENGINE OIL SAE 15W40 (37 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.

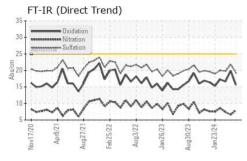
Fluid Condition

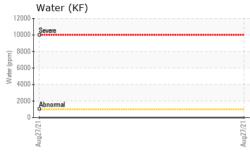
The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is suitable for further service.

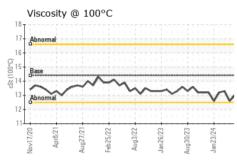
SAMPLE INFORMATION method limit/base current history1 history2							
Sample Date Client Info 28 May 2024 22 Apr 2024 20 Mar 2024 Machine Age hrs Client Info 0 528 21955	SAMPLE INFORM	ATION	method	limit/base	current	history1	history2
Machine Age hrs Client Info 0 528 21955 Oil Age hrs Client Info 0 528 283 Oil Changed Client Info Changed Changed Not Changd Sample Status Domain NoRMAL NORMAL NORMAL CONTAMINATION method limit/base current bistory1 bistory2 Fuel WC Method -4.0 <1.0 <1.0 <1.0 <1.0 Glycol WC Method NEG NEG NEG NEG WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >8 <1 <1 <1 WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >8 <1 <1 <1 WEAR METALS method limit/base current history1 history2 Iron	Sample Number		Client Info		WC0874582	WC0874629	WC0859922
Oil Age hrs Client Info Changed Changed Not Changed Sample Status Client Info Changed Changed Not Changed	Sample Date		Client Info		28 May 2024	22 Apr 2024	20 Mar 2024
Oil Changed Sample Status Client Info Changed NORMAL Not Changed NORMAL AST.0 41.0 41.0 41.0 41.0 41.0 41.0 42.0	Machine Age	hrs	Client Info		0	528	21955
Sample Status	Oil Age	hrs	Client Info		0	528	283
CONTAMINATION method limit/base current history1 history2 Fuel WC Method >4.0 <1.0 <1.0 <1.0 <1.0 Glycol WC Method NEG NEG NEG NEG WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >75 11 14 5 Chromium ppm ASTM D5185m >2 0 <1 <1 Nickel ppm ASTM D5185m >2 0 <1 <1 Nickel ppm ASTM D5185m >3 0 <1 <1 <1 Silver ppm ASTM D5185m >3 0 <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	Oil Changed		Client Info		Changed	Changed	Not Changd
Fuel	Sample Status				NORMAL	NORMAL	NORMAL
Glycol WC Method NEG NEG NEG WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >75 11 14 5 Chromium ppm ASTM D5185m >8 <1 <1 <1 Nickel ppm ASTM D5185m >2 0 <1 <1 Silver ppm ASTM D5185m >2 0 <1 <1 Aluminum ppm ASTM D5185m >15 <1 4 2 Lead ppm ASTM D5185m >18 <1 3 <1 Copper ppm ASTM D5185m >80 3 16 1 Tin ppm ASTM D5185m >80 3 16 1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <td< th=""><th>CONTAMINATION</th><th>l</th><th>method</th><th>limit/base</th><th>current</th><th>history1</th><th>history2</th></td<>	CONTAMINATION	l	method	limit/base	current	history1	history2
WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >75 11 14 5 Chromium ppm ASTM D5185m >8 <1 <1 <1 Nickel ppm ASTM D5185m >2 0 <1 <1 Silver ppm ASTM D5185m >2 0 <1 <1 Aluminum ppm ASTM D5185m >2 0 <1 <1 Aluminum ppm ASTM D5185m >15 <1 4 2 Lead ppm ASTM D5185m >80 3 16 1 Tin ppm ASTM D5185m >14 0 4 <1 Vanadium ppm ASTM D5185m <1 <1 <1 <1 Cadmium ppm ASTM D5185m 0 <1 <1 <1 ADDITIVES method limit/base current history1	Fuel		WC Method	>4.0	<1.0	<1.0	<1.0
Iron	Glycol		WC Method		NEG	NEG	NEG
Chromium ppm ASTM D5185m >8 <1	WEAR METALS		method	limit/base	current	history1	history2
Nickel	Iron	ppm	ASTM D5185m	>75	11	14	5
Titanium	Chromium	ppm	ASTM D5185m	>8	<1	<1	<1
Silver ppm ASTM D5185m >2 0 <1	Nickel	ppm	ASTM D5185m	>2	0	<1	<1
Aluminum ppm ASTM D5185m >15 <1	Titanium	ppm	ASTM D5185m	>3	0	<1	<1
Lead	Silver	ppm	ASTM D5185m	>2	0	<1	<1
Copper ppm ASTM D5185m >80 3 16 1 Tin ppm ASTM D5185m >14 0 4 <1 Vanadium ppm ASTM D5185m <1 <1 <1 Cadmium ppm ASTM D5185m 0 <1 <1 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 250 6 92 3 Barium ppm ASTM D5185m 10 0 0 0 Molybdenum ppm ASTM D5185m 100 64 71 64 Manganese ppm ASTM D5185m 100 64 71 64 Manganesium ppm ASTM D5185m 450 1429 891 1472 Calcium ppm ASTM D5185m 3000 1184 2759 1188 Phosphorus ppm ASTM D5185m 1350 1303 1868	Aluminum	ppm	ASTM D5185m	>15	<1	4	2
Tin ppm ASTM D5185m >14 0 4 <1 Vanadium ppm ASTM D5185m	Lead	ppm	ASTM D5185m	>18	<1	3	<1
Vanadium ppm ASTM D5185m <1	Copper	ppm	ASTM D5185m	>80	3	16	1
Cadmium ppm ASTM D5185m 0 <1	Tin	ppm	ASTM D5185m	>14	0	4	<1
ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 250 6 92 3 Barium ppm ASTM D5185m 10 0 0 0 Molybdenum ppm ASTM D5185m 100 64 71 64 Manganese ppm ASTM D5185m 100 64 71 64 Magnesium ppm ASTM D5185m 100 1429 891 1472 Calcium ppm ASTM D5185m 3000 1184 2759 1188 Phosphorus ppm ASTM D5185m 1350 1303 1868 1330 Sulfur ppm ASTM D5185m 4250 3901 4954 4024 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 4 10 4 Sodium ppm ASTM D5185m <	Vanadium	ppm	ASTM D5185m		<1	<1	<1
Boron ppm ASTM D5185m 250 6 92 3 Barium ppm ASTM D5185m 10 0 0 0 Molybdenum ppm ASTM D5185m 100 64 71 64 Manganese ppm ASTM D5185m 100 64 71 64 Magnesium ppm ASTM D5185m 450 1429 891 1472 Calcium ppm ASTM D5185m 3000 1184 2759 1188 Phosphorus ppm ASTM D5185m 1350 1303 1868 1330 Zinc ppm ASTM D5185m 1350 1303 1868 1330 Sulfur ppm ASTM D5185m 4250 3901 4954 4024 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 4 10 4 Sodium ppm ASTM D5185	Cadmium	ppm	ASTM D5185m		0	<1	<1
Barium ppm ASTM D5185m 10 0 0 Molybdenum ppm ASTM D5185m 100 64 71 64 Manganese ppm ASTM D5185m <1 <1 <1 Magnesium ppm ASTM D5185m 450 1429 891 1472 Calcium ppm ASTM D5185m 3000 1184 2759 1188 Phosphorus ppm ASTM D5185m 1150 1110 1682 1204 Zinc ppm ASTM D5185m 1350 1303 1868 1330 Sulfur ppm ASTM D5185m 4250 3901 4954 4024 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 4 10 4 Sodium ppm ASTM D5185m >158 2 7 <1 Potassium ppm ASTM D5185m >20	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum ppm ASTM D5185m 100 64 71 64 Manganese ppm ASTM D5185m <1	Boron	ppm	ASTM D5185m	250	6	92	3
Manganese ppm ASTM D5185m <1	Barium	ppm	ASTM D5185m	10	0	0	0
Magnesium ppm ASTM D5185m 450 1429 891 1472 Calcium ppm ASTM D5185m 3000 1184 2759 1188 Phosphorus ppm ASTM D5185m 1150 1110 1682 1204 Zinc ppm ASTM D5185m 1350 1303 1868 1330 Sulfur ppm ASTM D5185m 4250 3901 4954 4024 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 4 10 4 Sodium ppm ASTM D5185m >158 2 7 <1	Molybdenum	ppm	ASTM D5185m	100	64	71	64
Calcium ppm ASTM D5185m 3000 1184 2759 1188 Phosphorus ppm ASTM D5185m 1150 1110 1682 1204 Zinc ppm ASTM D5185m 1350 1303 1868 1330 Sulfur ppm ASTM D5185m 4250 3901 4954 4024 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 4 10 4 Sodium ppm ASTM D5185m >158 2 7 <1 Potassium ppm ASTM D5185m >20 0 4 2 Water % ASTM D6304 >0.1 NEG NEG NEG INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7624 >20 8.0 6.6 7.4	Manganese	ppm	ASTM D5185m		<1	<1	<1
Phosphorus ppm ASTM D5185m 1150 1110 1682 1204 Zinc ppm ASTM D5185m 1350 1303 1868 1330 Sulfur ppm ASTM D5185m 4250 3901 4954 4024 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 4 10 4 Sodium ppm ASTM D5185m >158 2 7 <1 Potassium ppm ASTM D5185m >20 0 4 2 Water % ASTM D6304 >0.1 NEG NEG NEG INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7624 >20 8.0 6.6 7.4	Magnesium	ppm	ASTM D5185m	450	1429	891	1472
Zinc ppm ASTM D5185m 1350 1303 1868 1330 Sulfur ppm ASTM D5185m 4250 3901 4954 4024 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 4 10 4 Sodium ppm ASTM D5185m >158 2 7 <1 Potassium ppm ASTM D5185m >20 0 4 2 Water % ASTM D6304 >0.1 NEG NEG NEG INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0.2 0.1 0.2 Nitration Abs/cm *ASTM D7624 >20 8.0 6.6 7.4	Calcium	ppm	ASTM D5185m	3000	1184	2759	1188
Sulfur ppm ASTM D5185m 4250 3901 4954 4024 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 4 10 4 Sodium ppm ASTM D5185m >158 2 7 <1 Potassium ppm ASTM D5185m >20 0 4 2 Water % ASTM D6304 >0.1 NEG NEG NEG INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0.2 0.1 0.2 Nitration Abs/cm *ASTM D7624 >20 8.0 6.6 7.4	Phosphorus	ppm	ASTM D5185m	1150	1110	1682	1204
CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 4 10 4 Sodium ppm ASTM D5185m >158 2 7 <1 Potassium ppm ASTM D5185m >20 0 4 2 Water % ASTM D6304 >0.1 NEG NEG NEG INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0.2 0.1 0.2 Nitration Abs/cm *ASTM D7624 >20 8.0 6.6 7.4	Zinc	ppm	ASTM D5185m	1350	1303	1868	1330
Silicon ppm ASTM D5185m >20 4 10 4 Sodium ppm ASTM D5185m >158 2 7 <1	Sulfur	ppm	ASTM D5185m	4250	3901	4954	4024
Sodium ppm ASTM D5185m >158 2 7 <1	CONTAMINANTS		method	limit/base	current	history1	history2
Potassium ppm ASTM D5185m >20 0 4 2 Water % ASTM D6304 >0.1 NEG NEG NEG INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0.2 0.1 0.2 Nitration Abs/cm *ASTM D7624 >20 8.0 6.6 7.4	Silicon	ppm	ASTM D5185m	>20	4	10	4
Water % ASTM D6304 >0.1 NEG NEG NEG INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0.2 0.1 0.2 Nitration Abs/cm *ASTM D7624 >20 8.0 6.6 7.4	Sodium	ppm	ASTM D5185m	>158	2	7	<1
INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0.2 0.1 0.2 Nitration Abs/cm *ASTM D7624 >20 8.0 6.6 7.4	Potassium	ppm	ASTM D5185m	>20	0	4	2
Soot % % *ASTM D7844 0.2 0.1 0.2 Nitration Abs/cm *ASTM D7624 >20 8.0 6.6 7.4	Water	%	ASTM D6304	>0.1	NEG	NEG	NEG
Nitration Abs/cm *ASTM D7624 >20 8.0 6.6 7.4	INFRA-RED		method	limit/base	current	history1	history2
	0 10/	%	*ASTM D7844		0.2	0.1	0.2
Sulfation Abs/.1mm *ASTM D7415 >30 19.3 21.8 19.8	Soot %		*ASTM D7624	>20	8.0	6.6	7.4
		Abs/cm					
FLUID DEGRADATION method limit/base current history1 history2	Nitration			>30	19.3	21.8	19.8
Oxidation	Nitration Sulfation	Abs/.1mm	*ASTM D7415				
Base Number (BN) mg KOH/g ASTM D2896 8.5 12.31 9.41 13.26	Nitration Sulfation FLUID DEGRADA	Abs/.1mm	*ASTM D7415 method	limit/base	current	history1	history2

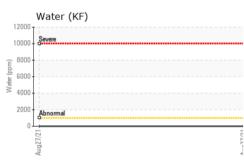


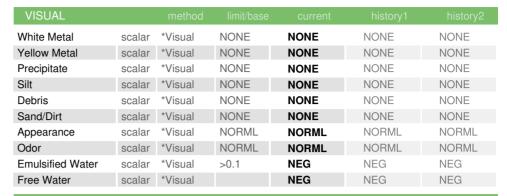
OIL ANALYSIS REPORT



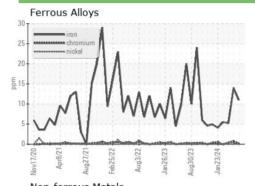


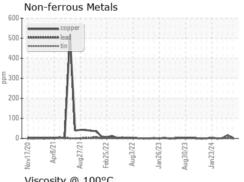


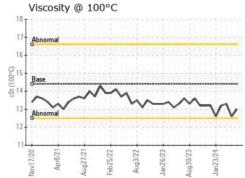


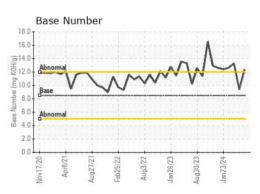


FLUID PROPER	ITIES	method				history2
Visc @ 100°C	cSt	ASTM D445	14.4	13.0	12.6	13.3













Certificate 12367

Laboratory Sample No.

: WC0874582 Lab Number : 06202976

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

Tested Unique Number : 11070437 Diagnosed Test Package : IND 2 (Additional Tests: KF)

: 11 Jun 2024 : 11 Jun 2024 - Sean Felton

: 07 Jun 2024

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)

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