

OIL ANALYSIS REPORT

Sample Rating Trend

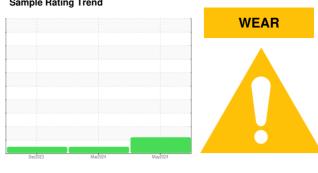
limit/base



MINING ME-70 CATERPILLAR 772 KEX00168 **Diesel Engine**

Fluid SHELL RIMULA SUPER SAE 15W40 (12 GAL)

SAMPLE INFORMATION method



history1

history2

current

DIAGNOSIS	

Recommendation

Oil and filter change at the time of sampling has been noted. Resample at the next service interval to monitor.

Area

🔺 Wear

The copper level is abnormal. In the absence of other significant wear metals, suspect copper due to sources other than wear (i.e. cooling core).

Contamination

Fuel content negligible. There is no indication of any contamination in the oil.

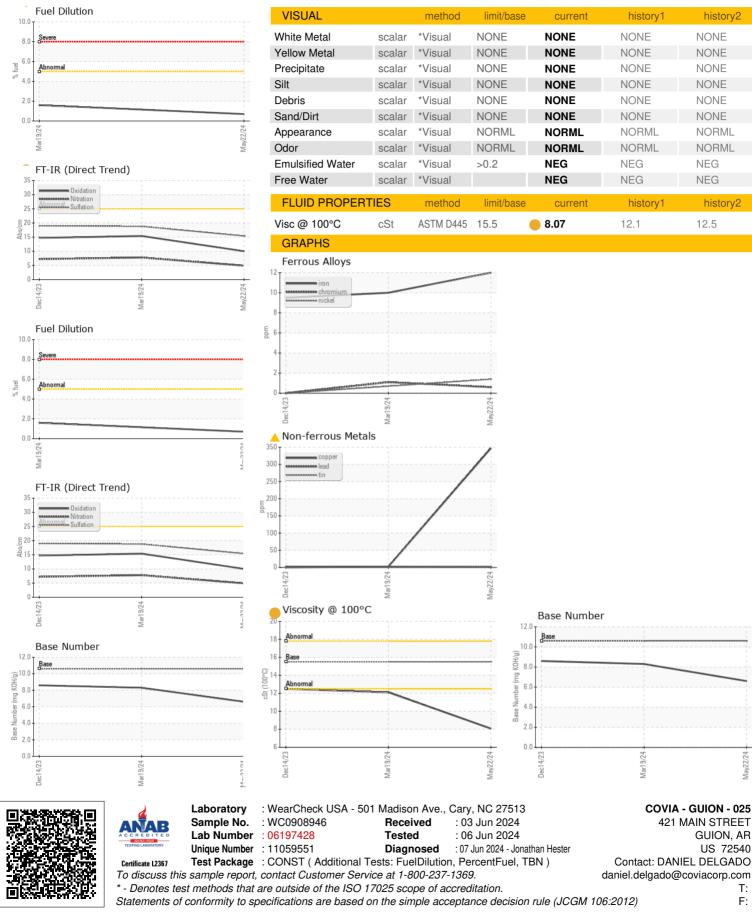
Fluid Condition

The oil viscosity is lower than normal. The BN result indicates that there is suitable alkalinity remaining in the oil. Confirm oil type.

Sample Date IClient Info 22 May 2024 19 Mar 2024 14 Dec 2023 Machine Age hrs Client Info 16729 16442 16060 Oil Age hrs Client Info 0 0 0 0 Sample Status Image Client Info Changed Changed <thchanged< th=""> Changed Changed</thchanged<>	Sample Number		Client Info		WC0908946	WC0901880	WC0864724
Oil Age hrs Client Info 0 0 0 Oil Changed Client Info Changed	Sample Date		Client Info		22 May 2024	19 Mar 2024	14 Dec 2023
Oil Changed Sample Status Client Info Changed ABNORMAL Changed NORMAL NORMAL NORMAL Water WC Method >0.2 NEG NEG NEG NEG NEG WeAR METALS method Imil/base current history1 history2 Iron ppm ASTMD5185m >20 <1 <1 0 Nickel ppm ASTMD5185m >2 <1 <1 0 Silver ppm ASTMD5185m >2 <1 <1 0 Copper ppm ASTMD5185m >300 347 2 <1 <1 Cadmium pm ASTMD5185m <1 <1 0 <1 0 ASTMD5185m 400 <1 <1 0 <1 0 ASTMD5185m <10 <1 <10 0 <1	Machine Age	hrs	Client Info		16729	16442	16060
Sample Status Image of the status ABNORMAL NORMAL NORMAL CONTAMINATION method imit/base current history1 history2 Water WC Method >0.2 NEG NEG NEG Glycol WC Method NEG NEG NEG NEG WEAR METALS method limit/base current history1 fibitory2 Iron ppm ASTM D5185 >100 12 10 10 Chromium ppm ASTM D5185 >2 1 <1 0 Nickel ppm ASTM D5185 >2 1 3 3 Silver ppm ASTM D5185 >40 <1 2 0 Copper ppm ASTM D5185 >40 <1 1 0 Cadmium ppm ASTM D5185 >40 <1 0 0 Cadmium pm ASTM D5185 >40 <1 0 0 <td< th=""><th>Oil Age</th><th>hrs</th><th>Client Info</th><th></th><th>0</th><th>0</th><th>0</th></td<>	Oil Age	hrs	Client Info		0	0	0
CONTAMINATION method limit/base current history1 history2 Water WC Method >0.2 NEG NEG NEG Glycol WC Method NEG NEG NEG NEG WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >20 <1 1 0 Nickel ppm ASTM D5185m >2 1 <1 0 Silver ppm ASTM D5185m >2 <1 0 0 Aluminum ppm ASTM D5185m >2 1 3 3 Lead ppm ASTM D5185m >2 1 0 0 Cadmium ppm ASTM D5185m >30 ▲347 2 <1 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m <1 1 0 0 Maganese ppm ASTM D5185m 0 <1 0 <th>Oil Changed</th> <th></th> <th>Client Info</th> <th></th> <th>Changed</th> <th>Changed</th> <th>Changed</th>	Oil Changed		Client Info		Changed	Changed	Changed
Water WC Method >0.2 NEG NEG NEG Glycol WC Method Imit/base current history1 history2 Iron ppm ASTM D5185m >20 <1 1 0 Nickel ppm ASTM D5185m >20 <1 1 0 Nickel ppm ASTM D5185m >2 1 <1 0 Silver ppm ASTM D5185m >2 <1 0 0 Aluminum ppm ASTM D5185m >2 1 3 3 Lead ppm ASTM D5185m >2 1 0 0 Copper ppm ASTM D5185m >40 <1 2 0 Vanadium ppm ASTM D5185m >15 <1 1 0 Cadmium ppm ASTM D5185m <1 0 0 0 Boron ppm ASTM D5185m 0 <1 0 0 <	Sample Status				ABNORMAL	NORMAL	NORMAL
Glycol WC Method NEG NEG NEG NEG WEAR METALS method limil/base current history1 history2 Iron ppm ASTM D5185m >20 <1 1 0 Nickel ppm ASTM D5185m >2 <1 <1 0 Nickel ppm ASTM D5185m >2 <1 <1 0 Aluminum ppm ASTM D5185m >2 <1 3 3 Lead ppm ASTM D5185m >40 <1 2 0 Copper ppm ASTM D5185m >15 <1 1 0 Vanadium ppm ASTM D5185m >15 <1 0 0 Cadmium ppm ASTM D5185m >15 <1 0 0 Cadmium ppm ASTM D5185m 0 <1 0 0 Cadmium ppm ASTM D5185m 15 0 <1 0	CONTAMINATION	N	method	limit/base	current	history1	history2
WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >100 12 10 10 Chromium ppm ASTM D5185m >20 <1 1 0 Nickel ppm ASTM D5185m >2 1 <1 0 Silver ppm ASTM D5185m >2 <1 0 0 Aluminum ppm ASTM D5185m >2 <1 0 0 Copper ppm ASTM D5185m >2 1 0 0 Cadmium ppm ASTM D5185m >330 ▲ 347 2 <1 Cadmium ppm ASTM D5185m 15 <1 1 0 Cadmium ppm ASTM D5185m <1 <1 0 0 Cadmium ppm ASTM D5185m 0 0 0 0 Boron ppm ASTM D5185m 0 0 <1	Water		WC Method	>0.2	NEG	NEG	NEG
Inn ppm ASTM D5185m >100 12 10 10 Chromium ppm ASTM D5185m >20 <1 1 0 Nickel ppm ASTM D5185m >2 1 <1 0 Silver ppm ASTM D5185m >2 <1 0 0 Aluminum ppm ASTM D5185m >2 1 3 3 Lead ppm ASTM D5185m >25 1 3 3 Lead ppm ASTM D5185m >330 ▲ 347 2 <1 Copper ppm ASTM D5185m >15 <1 1 0 Vanadium ppm ASTM D5185m 0 <1 0 0 Cadmium ppm ASTM D5185m 0 <1 0 0 Boron ppm ASTM D5185m 0 <1 0 0 Molybdenum ppm ASTM D5185m 15 6 3 <t< th=""><th>Glycol</th><th></th><th>WC Method</th><th></th><th>NEG</th><th>NEG</th><th>NEG</th></t<>	Glycol		WC Method		NEG	NEG	NEG
Chromium ppm ASTM D5185m >20 <1	WEAR METALS		method	limit/base	current	history1	history2
Nickel ppm ASTM D5185m >2 1 <1 0 Titanium ppm ASTM D5185m >2 <1	Iron	ppm	ASTM D5185m	>100	12	10	10
Titanium ppm ASTM D5185m >2 <1 <1 0 Silver ppm ASTM D5185m >2 <1	Chromium	ppm	ASTM D5185m	>20	<1	1	0
SilverppASTM D5185m >2 <100AluminumppmASTM D5185m>25133LeadppmASTM D5185m>40<1	Nickel	ppm	ASTM D5185m	>2	1	<1	0
AluminumppmASTM D5185m>25133LeadppmASTM D5185m>40<1	Titanium	ppm	ASTM D5185m	>2	<1	<1	0
Lead ppm ASTM D5185m >40 <1 2 0 Copper ppm ASTM D5185m >330 ▲ 347 2 <1	Silver	ppm	ASTM D5185m	>2	<1	0	0
Copper ppm ASTM D5185m >330 A 347 2 <1 Tin ppm ASTM D5185m >15 <1	Aluminum	ppm	ASTM D5185m	>25	1	3	3
Tin ppm ASTM D5185m >15 <1 1 0 Vanadium ppm ASTM D5185m 0 <1	Lead	ppm	ASTM D5185m	>40	<1	2	0
Vanadium ppm ASTM D5185m 0 <1 0 Cadmium ppm ASTM D5185m <1	Copper	ppm	ASTM D5185m	>330	A 347	2	<1
Cadmium ppm ASTM D5185m <1		ppm	ASTM D5185m	>15	<1	1	0
ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 0 0 0 Barium ppm ASTM D5185m 0 <1	Vanadium	ppm	ASTM D5185m		0	<1	0
Boron ppm ASTM D5185m 0 0 0 Barium ppm ASTM D5185m 0 <1 0 Molybdenum ppm ASTM D5185m 43 61 56 Manganese ppm ASTM D5185m 43 61 56 Magnesium ppm ASTM D5185m 499 541 629 Calcium ppm ASTM D5185m 2840 1056 1638 1458 Phosphorus ppm ASTM D5185m 1150 827 1197 1024 Zinc ppm ASTM D5185m 1270 942 1279 1253 Sulfur ppm ASTM D5185m 1270 942 1279 1253 Sulfur ppm ASTM D5185m 2829 2708 3663 3286 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 5 2 1	Cadmium	ppm	ASTM D5185m		<1	<1	0
Barium ppm ASTM D5185m 0 <1	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum ppm ASTM D5185m 43 61 56 Manganese ppm ASTM D5185m 0 <1 0 Magnesium ppm ASTM D5185m 499 541 629 Calcium ppm ASTM D5185m 2840 1056 1638 1458 Phosphorus ppm ASTM D5185m 2840 1056 1638 1458 Phosphorus ppm ASTM D5185m 1150 827 1197 1024 Zinc ppm ASTM D5185m 1270 942 1279 1253 Sulfur ppm ASTM D5185m 2829 2708 3663 3286 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 15 5 3 Sodium ppm ASTM D5185m >20 5 0.7 1.6 <1.0 Fuel % ASTM D5185m >20 5 <th>Boron</th> <th>ppm</th> <th>ASTM D5185m</th> <th></th> <th>0</th> <th>0</th> <th>0</th>	Boron	ppm	ASTM D5185m		0	0	0
Manganese ppm ASTM D5185m 0 <1 0 Magnesium ppm ASTM D5185m 499 541 629 Calcium ppm ASTM D5185m 2840 1056 1638 1458 Phosphorus ppm ASTM D5185m 2840 1056 1638 1458 Phosphorus ppm ASTM D5185m 1150 827 1197 1024 Zinc ppm ASTM D5185m 1270 942 1279 1253 Sulfur ppm ASTM D5185m 2829 2708 3663 3286 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 15 5 3 Sodium ppm ASTM D5185m >20 5 2 1 Fuel % ASTM D5185m >20 5 0.7 1.6 <1.0	Barium	ppm	ASTM D5185m		0	<1	0
Magnesium ppm ASTM D5185m 2840 1056 1638 1458 Phosphorus ppm ASTM D5185m 12840 1056 1638 1458 Phosphorus ppm ASTM D5185m 1150 827 1197 1024 Zinc ppm ASTM D5185m 1270 942 1279 1253 Sulfur ppm ASTM D5185m 2829 2708 3663 3286 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 15 5 3 Sodium ppm ASTM D5185m >20 5 2 1 Potassium ppm ASTM D5185m >20 5 2 1 Fuel % ASTM D5185m >20 5 2 1 Fuel % ASTM D5185m >20 5 2 1 Fuel % ASTM D7844 >3	Molybdenum	ppm	ASTM D5185m		43	61	56
Calcium ppm ASTM D5185m 2840 1056 1638 1458 Phosphorus ppm ASTM D5185m 1150 827 1197 1024 Zinc ppm ASTM D5185m 1270 942 1279 1253 Sulfur ppm ASTM D5185m 2829 2708 3663 3286 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 15 5 3 Sodium ppm ASTM D5185m >20 5 2 1 Potassium ppm ASTM D324 >5 0.7 1.6 <1.0	Manganese	ppm	ASTM D5185m		0	<1	0
Phosphorus ppm ASTM D5185m 1150 827 1197 1024 Zinc ppm ASTM D5185m 1270 942 1279 1253 Sulfur ppm ASTM D5185m 2829 2708 3663 3286 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 15 5 3 Sodium ppm ASTM D5185m >20 5 2 1 Potassium ppm ASTM D5185m >20 5 2 1 Fuel % ASTM D324 >5 0.7 1.6 <1.0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.1 0.2 0.2 Nitration Abs/.mm *ASTM D7624 >20 4.9 7.8 7.2 Sulfation Abs/.tim *ASTM D7644 <t< td=""><td>Magnesium</td><td>ppm</td><td>ASTM D5185m</td><td></td><th>499</th><td>541</td><td>629</td></t<>	Magnesium	ppm	ASTM D5185m		499	541	629
Zinc ppm ASTM D5185m 1270 942 1279 1253 Sulfur ppm ASTM D5185m 2829 2708 3663 3286 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 15 5 3 Sodium ppm ASTM D5185m >20 5 2 1 Potassium ppm ASTM D5185m >20 5 2 1 Fuel % ASTM D5324 >5 0.7 1.6 <1.0	Calcium	ppm	ASTM D5185m	2840	1056	1638	1458
SulfurppmASTM D5185m2829270836633286CONTAMINANTSmethodlimit/basecurrenthistory1history2SiliconppmASTM D5185m>251553SodiumppmASTM D5185m>20521PotassiumppmASTM D5185m>20521Fuel%ASTM D5185m>20521Soot %%ASTM D5185m>20521INFRA-RED%ASTM D5185m>20521Soot %%*ASTM D7844>30.10.20.2NitrationAbs/cm*ASTM D7624>204.97.87.2SulfationAbs/lim*ASTM D7415>3015.418.819.0FLUID DEGRADATIONmethodlimit/basecurrenthistory1history2OxidationAbs/lim*ASTM D7414>2510.015.414.7	Phosphorus	ppm	ASTM D5185m	1150	827	1197	1024
CONTAMINANTSmethodlimit/basecurrenthistory1history2SiliconppmASTM D5185m>251553SodiumppmASTM D5185m>20521PotassiumppmASTM D5185m>20521Fuel%ASTM D5185m>20521Fuel%ASTM D5185m>20521SodiumppmASTM D5185m>20521Fuel%ASTM D5185m>20521SodiumppmASTM D5185m>20521SodiumppmASTM D5185m>20521Fuel%ASTM D7844>30.71.6<1.0	Zinc	ppm	ASTM D5185m	1270	942	1279	1253
Silicon ppm ASTM D5185m >25 15 5 3 Sodium ppm ASTM D5185m >20 <1 0 <1 Potassium ppm ASTM D5185m >20 5 2 1 Fuel % ASTM D3524 >5 0.7 1.6 <1.0 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.1 0.2 0.2 Nitration Abs/cm *ASTM D7624 >20 4.9 7.8 7.2 Sulfation Abs/.1mm *ASTM D7415 >30 15.4 18.8 19.0 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 10.0 15.4 14.7	Sulfur	ppm	ASTM D5185m	2829	2708	3663	3286
Sodium ppm ASTM D5185m <1	CONTAMINANTS		method	limit/base	current	history1	history2
Potassium ppm ASTM D5185m >20 5 2 1 Fuel % ASTM D3524 >5 0.7 1.6 <1.0	Silicon	ppm	ASTM D5185m	>25	15	5	3
Fuel % ASTM D3524 >5 0.7 1.6 <1.0	Sodium	ppm	ASTM D5185m		<1	0	<1
INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.1 0.2 0.2 Nitration Abs/cm *ASTM D7624 >20 4.9 7.8 7.2 Sulfation Abs/.tm *ASTM D7415 >30 15.4 18.8 19.0 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.tmm *ASTM D7414 >25 10.0 15.4 14.7	Potassium	ppm	ASTM D5185m	>20	5	2	1
Soot % % *ASTM D7844 >3 0.1 0.2 0.2 Nitration Abs/cm *ASTM D7624 >20 4.9 7.8 7.2 Sulfation Abs/.1mm *ASTM D7415 >30 15.4 18.8 19.0 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 10.0 15.4 14.7	Fuel	%	ASTM D3524	>5	0.7	1.6	<1.0
Nitration Abs/cm *ASTM D7624 >20 4.9 7.8 7.2 Sulfation Abs/.1mm *ASTM D7615 >30 15.4 18.8 19.0 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 10.0 15.4 14.7	INFRA-RED		method	limit/base	current	history1	history2
Sulfation Abs/.1mm *ASTM D7415 >30 15.4 18.8 19.0 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 10.0 15.4 14.7	Soot %	%	*ASTM D7844	>3	0.1	0.2	0.2
FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 10.0 15.4 14.7	Nitration	Abs/cm	*ASTM D7624	>20	4.9	7.8	7.2
Oxidation Abs/.1mm *ASTM D7414 >25 10.0 15.4 14.7	Sulfation	Abs/.1mm	*ASTM D7415	>30	15.4	18.8	19.0
	FLUID DEGRADA	TION	method	limit/base	current	history1	history2
Base Number (BN) mg KOH/g ASTM D2896 10.6 6.6 8.3 8.6	Oxidation	Abs/.1mm	*ASTM D7414	>25	10.0	15.4	14.7
	Base Number (BN)	mg KOH/g	ASTM D2896	10.6	6.6	8.3	8.6



OIL ANALYSIS REPORT



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Contact/Location: DANIEL DELGADO - COVGUI

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