

OIL ANALYSIS REPORT

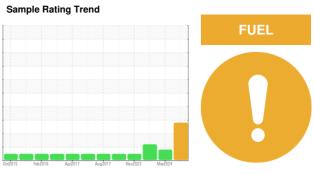




CATERPILLAR 980 HAUL LOADER 6583 (S/N JMS05055)

Diesel Engine

TULCO LUBSOIL CK-4 15W40 (--- GAL)



DIAGNOSIS

Recommendation

We advise that you check all areas where contaminants can enter the system. The air breather requires service. If unrated, we recommend that you replace with a suitable micron rated and/or desiccant air breather. If rated, we recommend that you service/replace the breather. We advise that you perform a filter service, and use off-line filtration to improve the cleanliness of the system fluid. No corrective action is recommended at this time. Confirm the source of the lubricant being utilized for top-up/fill. Resample at the next service interval to monitor.

Wear

All component wear rates are normal.

Contamination

Calcium and/or magnesium levels higher than normal indicating possible contamination with cement dust, advise investigate. Light fuel dilution occurring. No other contaminants were detected in the oil.

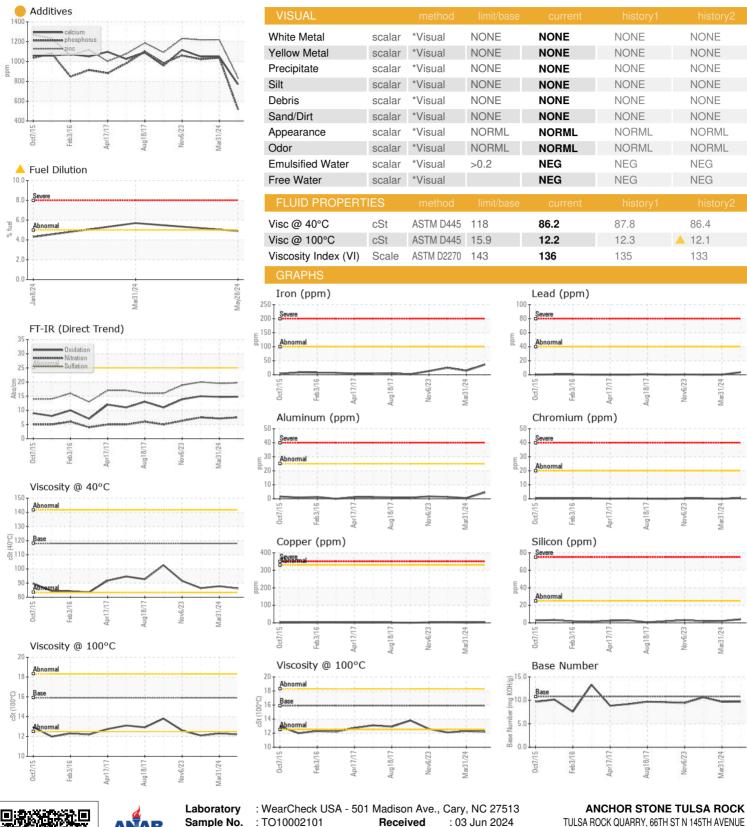
Fluid Condition

Additive levels indicate the addition of a different brand, or type of oil. The BN result indicates that there is suitable alkalinity remaining in the oil. The condition of the oil is acceptable for the time in service.

Oil Changed Sample Status Client Info Not Changd ATTENTION Not Changd ABNORMAL Changed ABNORMAL CONTAMINATION method limit/base current history1 history2 Water WC Method >0.2 NEG NEG NEG Glycol WC Method NEG NEG NEG WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >100 36 14 25 Chromium ppm ASTM D5185m >20 <1							
Sample Date Client Info 28 May 2024 31 Mar 2024 08 Jan 2024 Machine Age hrs Client Info 35122 30863 34718 Oil Age hrs Client Info 404 305 539 Oil Changed Client Info Not Changd Not Changd Changed ABNORMAL Sample Status ATTENTION Mot Changd ABNORMAL ABNORMAL CONTAMINATION method Imilibase current history1 history2 Water WC Method >0.2 NEG NEG NEG WEAR METALS method Imilibase current history1 history2 Iron ppm ASTM 51858h >20 <1	SAMPLE INFORM	MATION	method	limit/base	current	history1	history2
Machine Age hrs Client Info 35122 30863 34718 Oil Age hrs Client Info 404 305 539 Oil Changed Client Info Not Changd ABNORMAL ABNORMAL Sample Status Branch Imilibase current history1 history2 Water WC Method >0.2 NEG NEG NEG Glycol WC Method NEG NEG NEG NEG WEAR METALS method limil/base current history1 history2 Iron ppm ASTM D5185m >20 <1 0 <1 Nickel ppm ASTM D5185m >20 <1 0 <1 Nikele ppm ASTM D5185m >22 <1 0 0 Aluminum ppm ASTM D5185m >22 <1 0 0 Aluminum ppm ASTM D5185m >24 <1 1 0 Copper	Sample Number		Client Info		TO10002101		TO10003076
Oil Age hrs Client Info 404 305 539 Oil Changed Sample Status Client Info Not Changd ATTENTION Not Changed Changed Changed Changed Changed Changed Changed Changed Changed Washer WC Method Imitions Current Current history1 history2 Water WC Method >0.2 NEG NEG NEG WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >100 36 14 25 Chromium ppm ASTM D5185m >20 <1	Sample Date		Client Info		28 May 2024	31 Mar 2024	08 Jan 2024
Client Info Not Changd ATTENTION ABNORMAL AB	Machine Age	hrs	Client Info		35122	30863	34718
ATTENTION	Oil Age	hrs	Client Info		404	305	539
CONTAMINATION method limit/base current history1 history2 Water WC Method >0.2 NEG NEG NEG Glycol WC Method NEG NEG NEG WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >20 <1 0 <1 Nickel ppm ASTM D5185m >20 <1 0 0 Silver ppm ASTM D5185m >2 <1 0 0 Copper ppm ASTM D5185m >40 4 <1 0 Copper ppm ASTM D5185m >15 <1 <1 0 Vanadiu	Oil Changed		Client Info		Not Changd	Not Changd	0
Water Glycol WC Method WC Method >0.2 NEG NEG NEG NEG NEG WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >100 36 14 25 Chromium ppm ASTM D5185m >20 <1	Sample Status				ATTENTION	ABNORMAL	ABNORMAL
WEAR METALS	CONTAMINATION	١	method	limit/base	current	history1	history2
WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >100 36 14 25 Chromium ppm ASTM D5185m >20 <1 0 <1 Nickel ppm ASTM D5185m >2 <1 0 0 Titanium ppm ASTM D5185m >2 <1 0 0 Aluminum ppm ASTM D5185m >2 <1 0 0 Aluminum ppm ASTM D5185m >2 <1 1 0 Lead ppm ASTM D5185m >40 4 <1 0 Copper ppm ASTM D5185m >40 4 <1 0 Vanadium ppm ASTM D5185m >15 <1 <1 0 0 Vanadium ppm ASTM D5185m >1 <1 0 0 0 Cadmium ppm ASTM D5185m >1 </th <th>Water</th> <th></th> <th>WC Method</th> <th>>0.2</th> <th>NEG</th> <th>NEG</th> <th>NEG</th>	Water		WC Method	>0.2	NEG	NEG	NEG
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Chromium ppm ASTM D5185m >20 <1	WEAR METALS		method	limit/base	current	history1	history2
Nickel	Iron	ppm	ASTM D5185m	>100	36	14	25
Titanium	Chromium	ppm	ASTM D5185m	>20	<1	0	<1
Silver ppm ASTM D5185m >2 0 0 0 Aluminum ppm ASTM D5185m >25 4 <1 1 Lead ppm ASTM D5185m >40 4 <1 0 Copper ppm ASTM D5185m >330 4 2 4 Tin ppm ASTM D5185m >15 <1 <1 0 Vanadium ppm ASTM D5185m >15 <1 <1 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 0 0 0 0 ADDITIVES method limit/base current history1 histo	Nickel	ppm	ASTM D5185m	>2	<1	0	0
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Phosphorus ppm ASTM D5185m 1170 520 1037 1023 Zinc ppm ASTM D5185m 1230 836 1220 1218 Sulfur ppm ASTM D5185m 3130 1725 3374 2989 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 4 2 2 Sodium ppm ASTM D5185m >20 4 0 0 Potassium ppm ASTM D5185m >20 4 0 0 Fuel % ASTM D3524 >5 4.9 5.7 4.3 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7624 >20 7.5 7.1 7.5 Sulfation Abs/.1mm *ASTM D7415 >30 19.7 19.5 20.0 FLUID DEGRADATION *ASTM D7414 <td< td=""><td>Boron Barium Molybdenum</td><td>ppm ppm</td><td>ASTM D5185m ASTM D5185m ASTM D5185m</td><td></td><th>4 0 34</th><td>9 0 57</td><td>9 0 59</td></td<>	Boron Barium Molybdenum	ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m		4 0 34	9 0 57	9 0 59
Zinc ppm ASTM D5185m 1230 836 1220 1218 Sulfur ppm ASTM D5185m 3130 1725 3374 2989 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 4 2 2 Sodium ppm ASTM D5185m >20 4 0 0 Potassium ppm ASTM D5185m >20 4 0 0 Fuel % ASTM D3524 >5 ▲ 4.9 ▲ 5.7 ▲ 4.3 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.4 0.4 0.5 Nitration Abs/cm *ASTM D7624 >20 7.5 7.1 7.5 Sulfation Abs/.1mm *ASTM D7415 >30 19.7 19.5 20.0 FLUID DEGRADATION method	Boron Barium Molybdenum Manganese	ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	65	4 0 34 0	9 0 57 <1	9 0 59 <1
Sulfur ppm ASTM D5185m 3130 1725 3374 2989 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 4 2 2 Sodium ppm ASTM D5185m >20 4 0 0 Potassium ppm ASTM D5185m >20 4 0 0 Fuel % ASTM D5185m >20 4 0 0 Soot % % *ASTM D7844 >3 0.4 0.4 0.5 Nitration Abs/cm *ASTM D7624 >20 7.5 7.1 7.5 Sulfation Abs/.1mm *ASTM D7415 >30 19.7	Boron Barium Molybdenum Manganese Magnesium	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	65	4 0 34 0 • 490	9 0 57 <1 907	9 0 59 <1 868
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Fuel % ASTM D3524 >5 ▲ 4.9 ▲ 5.7 ▲ 4.3 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.4 0.4 0.5 Nitration Abs/cm *ASTM D7624 >20 7.5 7.1 7.5 Sulfation Abs/.1mm *ASTM D7415 >30 19.7 19.5 20.0 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 14.8 14.7 15.0	Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS	ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	65 1060 1140 1170 1230 3130 limit/base	4 0 34 0 490 770 520 836 1725	9 0 57 <1 907 1048 1037 1220 3374 history1	9 0 59 <1 868 1049 1023 1218 2989
INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >3 0.4 0.4 0.5 Nitration Abs/cm *ASTM D7624 >20 7.5 7.1 7.5 Sulfation Abs/.1mm *ASTM D7415 >30 19.7 19.5 20.0 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 14.8 14.7 15.0	Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	65 1060 1140 1170 1230 3130 limit/base	4 0 34 0 490 770 520 836 1725 current	9 0 57 <1 907 1048 1037 1220 3374 history1	9 0 59 <1 868 1049 1023 1218 2989 history2
Soot % % *ASTM D7844 >3 0.4 0.4 0.5 Nitration Abs/cm *ASTM D7624 >20 7.5 7.1 7.5 Sulfation Abs/.1mm *ASTM D7415 >30 19.7 19.5 20.0 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 14.8 14.7 15.0	Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	65 1060 1140 1170 1230 3130 limit/base >25	4 0 34 0 490 770 520 836 1725 current 4	9 0 57 <1 907 1048 1037 1220 3374 history1 2 2	9 0 59 <1 868 1049 1023 1218 2989 history2 2 0
Nitration Abs/cm *ASTM D7624 >20 7.5 7.1 7.5 Sulfation Abs/.1mm *ASTM D7415 >30 19.7 19.5 20.0 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 14.8 14.7 15.0	Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium	ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	65 1060 1140 1170 1230 3130 limit/base >25 >20	4 0 34 0 490 770 520 836 1725 current 4 10	9 0 57 <1 907 1048 1037 1220 3374 history1 2 2 0	9 0 59 <1 868 1049 1023 1218 2989 history2 2 0 0
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Sulfation Abs/.1mm *ASTM D7415 >30 19.7 19.5 20.0 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 14.8 14.7 15.0	Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Fuel INFRA-RED	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m	65 1060 1140 1170 1230 3130 limit/base >25 >20 >5 limit/base	4 0 34 0 490 770 520 836 1725 current 4 10 4 4.9 current	9 0 57 <1 907 1048 1037 1220 3374 history1 2 2 0 ▲ 5.7	9 0 59 <1 868 1049 1023 1218 2989 history2 2 0 0
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	Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Fuel INFRA-RED Soot % Nitration	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D7844 *ASTM D7844	65 1060 1140 1170 1230 3130 limit/base >25 >20 >5 limit/base >3 >20	4 0 34 0 490 770 520 836 1725 current 4 10 4 10 4 10 4 7.5	9 0 57 <1 907 1048 1037 1220 3374 history1 2 2 0 ▲ 5.7 history1 0.4 7.1	9 0 59 <1 868 1049 1023 1218 2989 history2 2 0 0 4.3 history2 0.5 7.5
	Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Fuel INFRA-RED Soot % Nitration Sulfation	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D7844 *ASTM D7624 *ASTM D76145	65 1060 1140 1170 1230 3130 limit/base >25 >20 >5 limit/base >3 >20 >30	4 0 34 0 490 770 520 836 1725 current 4 10 4 10 4 10 4 10 10 10 10 10 10 10 10 10 10	9 0 57 <1 907 1048 1037 1220 3374 history1 2 2 0 ▲ 5.7 history1 0.4 7.1 19.5	9 0 59 <1 868 1049 1023 1218 2989 history2 2 0 0 4.3 history2 0.5 7.5 20.0
	Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium Fuel INFRA-RED Soot % Nitration Sulfation FLUID DEGRADA	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D7844 *ASTM D7844 *ASTM D7624 *ASTM D7415 method	65 1060 1140 1170 1230 3130 limit/base >25 >20 >5 limit/base >3 >20 >30 limit/base	4 0 34 0 490 770 520 836 1725 current 4 10 4 • 4.9 current 0.4 7.5 19.7 current	9 0 57 <1 907 1048 1037 1220 3374 history1 2 2 0 ▲ 5.7 history1 0.4 7.1 19.5 history1	9 0 59 <1 868 1049 1023 1218 2989 history2 2 0 0 1 4.3 history2 0.5 7.5 20.0 history2



OIL ANALYSIS REPORT







Sample No.

: TO10002101 Lab Number : 06198340 Unique Number : 11060463

Received

Tested Diagnosed Test Package: MOB 2 (Additional Tests: KV40, PercentFuel, VI)

: 05 Jun 2024 : 05 Jun 2024 - Wes Davis

TULSA ROCK QUARRY, 66TH ST N 145TH AVENUE TULSA, OK US 74137 Contact: MIKE SNYDER

Certificate 12367 To discuss this sample report, contact Customer Service at 1-800-237-1369. st - Denotes test methods that are outside of the ISO 17025 scope of accreditation.

T: (417)850-9635 Statements of conformity to specifications are based on the simple acceptance decision rule (JCGM 106:2012) F:

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