

OIL ANALYSIS REPORT

Area (BD56834) {UNASSIGNED} Machine Id 914045 MACK TE64R Component

Diesel Engine

TIER ONE 15W40 (--- GAL)

SIS REPORT ASSIGNED} TE64R AL) SAMPLE INFORMATION method limit/base current history1 history2

Sample Rating Trend

Sample Date Client Info 21 Feb 2024 13 Nov 2023 Machine Age hrs Client Info 1170 435 Oil Age hrs Client Info 1 435 Sample Status Client Info 1 435 CONTAMINATION method Imit/base current history1 history2 Fuel WC Method >3.0 <1.0 Qlycol WC Method >0.2 NEG NEG WEAR METALS method imit/base current history1 history2 for ppm ASTM 05185m >12.0 16 3 Nickel ppm ASTM 05185m >2.0 <1 0 Silver ppm ASTM 05185m >2.0 2 1 Astmore ppm ASTM 05185m >2.0 2 1 Silver ppm A	SAMPLE INFUR		method	limit/base	current	nistory i	nistory2
Machine Age hrs Client Info 1170 435 Oil Age hrs Client Info 1 435 Oil Changed Client Info 1 435 Sample Status Client Info Changed Not Changed Sample Status WC Method >3.0 <1.0	Sample Number		Client Info		GFL0061435	GFL0061441	
Oil Age Inrs Client Info I 435 Oil Changed Client Info Changed Not Changed Sample Status Image Image Not Changed Not Changed CONTAMINATION method Imitibase current Inistory2 Water WC Method >3.0 <1.0	Sample Date		Client Info		21 Feb 2024	13 Nov 2023	
Oil Age Inrs Client Info I 435 Oil Changed Client Info Changed Not Changed Sample Status Image Image Not Changed Not Changed CONTAMINATION method Imitibase current Inistory2 Water WC Method >3.0 <1.0	Machine Age	hrs	Client Info		1170	435	
Oil Changed Client Info Changed Not Changed Sample Status r r r r r CONTAMINATION method limit/base current history1 history2 Fuel WC Method >3.0 <1.0	•	hrs	Client Info		1	435	
Sample Status MARGINAL NORMAL CONTAMINATION method limit/base current history1 history2 Fuel WC Method >3.0 <1.0	-				Changed	Not Changd	
Fuel WC Method >3.0 <1.0 <1.0 Water WC Method >0.2 NEG NEG Glycol WC Method >0.2 NEG NEG WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >20 <1	-				-	NORMAL	
Fuel WC Method >3.0 <1.0 <1.0 Water WC Method >0.2 NEG NEG Glycol WC Method >0.2 NEG NEG WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >20 <1	CONTAMINAT	ION	method	limit/base	current	history1	history2
Water WC Method >0.2 NEG NEG Glycol WC Method Imit/base current history1 history2 Iron ppm ASTM D5185m >120 16 3 Chromium ppm ASTM D5185m >5 3 0 Nickel ppm ASTM D5185m >22 <1			WC Method	>3.0	~10		
Glycol WC Method NEG NEG WEAR METALS method limil/base current history1 history2 Iron ppm ASTM D5185m >20 <1							
WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >120 16 3 Othromium ppm ASTM D5185m >20 <1				20.L			
Iron ppm ASTM 05185m >120 16 3 Chromium ppm ASTM 05185m >20 <1	-	S		limit/base	-		history?
Chromium ppm ASTM D5185m >20 <1 <1 Nickel ppm ASTM D5185m >5 3 0 Titanium ppm ASTM D5185m >2 <1							
Nickel ppm ASTM D5185m >5 3 0 Titanium ppm ASTM D5185m >2 <1	-				-		
Titanium ppm ASTM D5185m >2 <1 <1 Silver ppm ASTM D5185m >2 1 0 Aluminum ppm ASTM D5185m >20 2 1 Lead ppm ASTM D5185m >40 2 0 Copper ppm ASTM D5185m >330 A 202 6 Vanadium ppm ASTM D5185m >330 A 202 6 Vanadium ppm ASTM D5185m >15 <1							
Silver ppm ASTM D5185m >2 1 0 Aluminum ppm ASTM D5185m >20 2 1 Lead ppm ASTM D5185m >40 2 0 Copper ppm ASTM D5185m >40 202 6 Vanadium ppm ASTM D5185m >15 <1 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 11 17 7 Barium ppm ASTM D5185m 57 53 Molydenum ppm ASTM D5185m 839 780 Magnese ppm ASTM D5185m 839 780 Calcium ppm ASTM D5185m 2547 3063 Sulfur ppm ASTM D5185m >25 8 29 <tr< td=""><td></td><td></td><td></td><td></td><td>-</td><td></td><td></td></tr<>					-		
Aluminum ppm ASTM D5185m >20 2 1 Lead ppm ASTM D5185m >40 2 0 Copper ppm ASTM D5185m >330 ▲ 202 6 Tin ppm ASTM D5185m >15 <1							
Lead ppm ASTM D5185m >40 2 0 Copper ppm ASTM D5185m >330 ▲ 202 6 Tin ppm ASTM D5185m >15 <1					-		
Copper ppm ASTM D5185m >330 ▲ 202 6 Tin ppm ASTM D5185m >15 <1							
Tin ppm ASTM D5185m >15 <1 0 Vanadium ppm ASTM D5185m 0 0 <1 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 11 17 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 11 17 Molybdenum ppm ASTM D5185m 57 53 Magnese ppm ASTM D5185m 839 780 Magnesium ppm ASTM D5185m 937 892 Calcium ppm ASTM D5185m 937 892 Sulfur ppm ASTM D5185m 2547 3063 Sulfur ppm ASTM D5185m >20 4 3 Sodium ppm ASTM					_		
Vanadium ppm ASTM D5185m 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 11 17 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 11 17 Barium ppm ASTM D5185m 11 17 Manganese ppm ASTM D5185m 57 53 Manganese ppm ASTM D5185m 839 780 Magnesium ppm ASTM D5185m 937 892 Calcium ppm ASTM D5185m 937 892 Sulfur ppm ASTM D5185m 2547 3063 Sulfur ppm ASTM D5185m >20 4 3 Sodium ppm ASTM D5185m >20		ppm			-		
CadmiumppmASTM D5185m0<1ADDITIVESmethodlimit/basecurrenthistory1history2BoronppmASTM D5185m1117BariumppmASTM D5185m<1				>15			
ADDITIVESmethodlimit/basecurrenthistory1history2BoronppmASTM D5185m1117BariumppmASTM D5185m<1	Vanadium	ppm	ASTM D5185m		-	0	
Boron ppm ASTM D5185m 11 17 Barium ppm ASTM D5185m <1	Cadmium	ppm	ASTM D5185m		0	<1	
Barium ppm ASTM D5185m <1 <1 <1 Molybdenum ppm ASTM D5185m 57 53 Manganese ppm ASTM D5185m 61 0 Magnesium ppm ASTM D5185m 839 780 Calcium ppm ASTM D5185m 839 780 Calcium ppm ASTM D5185m 937 892 Zinc ppm ASTM D5185m 937 892 Sulfur ppm ASTM D5185m 2547 3063 Sulfur ppm ASTM D5185m >25 8 29 Solicon ppm ASTM D5185m >25 8 29 Solicon ppm ASTM D5185m >20 4 3 INFRA-RED method limit/base current history1 history2 Soot % % 'ASTM D78	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum ppm ASTM D5185m 57 53 Manganese ppm ASTM D5185m <1	Boron	ppm	ASTM D5185m		11	17	
Manganese ppm ASTM D5185m <1 0 Magnesium ppm ASTM D5185m 839 780 Calcium ppm ASTM D5185m 1082 969 Phosphorus ppm ASTM D5185m 937 892 Zinc ppm ASTM D5185m 937 892 Sulfur ppm ASTM D5185m 937 8063 Sulfur ppm ASTM D5185m 2547 3063 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 8 29 Sodium ppm ASTM D5185m >20 4 3 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >4 0.5 0.1 Sulfation Abs/.1mm<	Barium	ppm	ASTM D5185m		<1	<1	
Magnesium ppm ASTM D5185m 839 780 Calcium ppm ASTM D5185m 1082 969 Phosphorus ppm ASTM D5185m 937 892 Zinc ppm ASTM D5185m 937 892 Zinc ppm ASTM D5185m 937 8063 Sulfur ppm ASTM D5185m 2547 3063 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 8 29 Sodium ppm ASTM D5185m >20 4 3 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >4 0.5 0.1 Nitration Abs/cm *ASTM D7624 >20 8.3 4.5 Sulfation	Molybdenum	ppm	ASTM D5185m		57	53	
Calcium ppm ASTM D5185m 1082 969 Phosphorus ppm ASTM D5185m 937 892 Zinc ppm ASTM D5185m 937 892 Sulfur ppm ASTM D5185m 1148 1091 Sulfur ppm ASTM D5185m 2547 3063 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 8 29 Sodium ppm ASTM D5185m 3 2 Potassium ppm ASTM D5185m 3 2 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >4 0.5 0.1 Sulfation Abs/.tmm *ASTM D7414 >20 8.3 4.5 FLUID DEGRADATION	Manganese	ppm	ASTM D5185m		<1	0	
Phosphorus ppm ASTM D5185m 937 892 Zinc ppm ASTM D5185m 1148 1091 Sulfur ppm ASTM D5185m 2547 3063 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >25 8 29 Sodium ppm ASTM D5185m >25 8 29 Sodium ppm ASTM D5185m >20 4 3 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >4 0.5 0.1 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7624 >20 8.3 4.5 Sulfation Abs/.tmm *ASTM D7415 >30 20.3 17.6	Magnesium	ppm	ASTM D5185m		839	780	
ZincppmASTM D5185m11481091SulfurppmASTM D5185m25473063CONTAMINANTSmethodlimit/basecurrenthistory1history2SiliconppmASTM D5185m>25829SodiumppmASTM D5185m>25829SodiumppmASTM D5185m>2043INFRA-REDmethodlimit/basecurrenthistory1history2Soot %%*ASTM D7844>40.50.1NitrationAbs/cm*ASTM D7624>208.34.5SulfationAbs/Imm*ASTM D7415>3020.317.6FLUID DEGRADATIONmethodlimit/basecurrenthistory1history2OxidationAbs/.1mm*ASTM D7414>2516.512.8	Calcium	ppm	ASTM D5185m		1082	969	
SulfurppmASTM D5185m25473063CONTAMINANTSmethodlimit/basecurrenthistory1history2SiliconppmASTM D5185m>25829SodiumppmASTM D5185m>2043PotassiumppmASTM D5185m>2043INFRA-REDmethodlimit/basecurrenthistory1history2Soot %%*ASTM D7844>40.50.1NitrationAbs/cm*ASTM D7624>208.34.5SulfationAbs/lim*ASTM D7415>3020.317.6FLUID DEGRADATIONmethodlimit/basecurrenthistory1history2OxidationAbs/.imm*ASTM D7414>2516.512.8	Phosphorus	ppm	ASTM D5185m		937	892	
CONTAMINANTSmethodlimit/basecurrenthistory1history2SiliconppmASTM D5185m>25829SodiumppmASTM D5185m>2043PotassiumppmASTM D5185m>2043INFRA-REDmethodlimit/basecurrenthistory1history2Soot %%*ASTM D7844>40.50.1NitrationAbs/cm*ASTM D7624>208.34.5SulfationAbs/.1mm*ASTM D7415>3020.317.6FLUID DEGRADATIONmethodlimit/basecurrenthistory1history2OxidationAbs/.1mm*ASTM D7414>2516.512.8	Zinc	ppm	ASTM D5185m		1148	1091	
Silicon ppm ASTM D5185m >25 8 29 Sodium ppm ASTM D5185m >20 3 2 Potassium ppm ASTM D5185m >20 4 3 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >4 0.5 0.1 Nitration Abs/cm *ASTM D7624 >20 8.3 4.5 Sulfation Abs/.1mm *ASTM D7415 >30 20.3 17.6 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 16.5 12.8	Sulfur	ppm	ASTM D5185m		2547	3063	
Sodium ppm ASTM D5185m 3 2 Potassium ppm ASTM D5185m >20 4 3 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >4 0.5 0.1 Nitration Abs/cm *ASTM D7624 >20 8.3 4.5 Sulfation Abs/.1mm *ASTM D7415 >30 20.3 17.6 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 16.5 12.8	CONTAMINAN	то	method	limit/baco			biotory ()
Potassium ppm ASTM D5185m >20 4 3 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 >4 0.5 0.1 Nitration Abs/cm *ASTM D7624 >20 8.3 4.5 Sulfation Abs/.1mm *ASTM D7415 >30 20.3 17.6 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 16.5 12.8		15	methou	IIIII/Dase	current	history1	nistory2
INFRA-REDmethodlimit/basecurrenthistory1history2Soot %%*ASTM D7844>40.50.1NitrationAbs/cm*ASTM D7624>208.34.5SulfationAbs/.tmm*ASTM D7415>3020.317.6FLUID DEGRADATIONmethodlimit/basecurrenthistory1history2OxidationAbs/.tmm*ASTM D7414>2516.512.8	Silicon						
Soot % % *ASTM D7844 >4 0.5 0.1 Nitration Abs/cm *ASTM D7624 >20 8.3 4.5 Sulfation Abs/.1mm *ASTM D7415 >30 20.3 17.6 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 16.5 12.8		ppm	ASTM D5185m		8	29	
Nitration Abs/cm *ASTM D7624 >20 8.3 4.5 Sulfation Abs/.1mm *ASTM D7415 >30 20.3 17.6 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 16.5 12.8	Sodium	ppm ppm	ASTM D5185m ASTM D5185m	>25	8 3	29 2	
Nitration Abs/cm *ASTM D7624 >20 8.3 4.5 Sulfation Abs/.1mm *ASTM D7615 >30 20.3 17.6 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 16.5 12.8	Sodium Potassium	ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m	>25 >20	8 3 4	29 2 3	
Sulfation Abs/.1mm *ASTM D7415 >30 20.3 17.6 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 16.5 12.8	Sodium Potassium INFRA-RED	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m method	>25 >20 limit/base	8 3 4 current	29 2 3 history1	 history2
Oxidation Abs/.1mm *ASTM D7414 >25 16.5 12.8	Sodium Potassium INFRA-RED Soot %	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m method *ASTM D7844	>25 >20 limit/base >4	8 3 4 <u>current</u> 0.5	29 2 3 history1 0.1	 history2
	Sodium Potassium INFRA-RED Soot % Nitration	ppm ppm ppm % Abs/cm	ASTM D5185m ASTM D5185m ASTM D5185m method *ASTM D7844 *ASTM D7624	>25 >20 limit/base >4 >20	8 3 4 <u>current</u> 0.5 8.3	29 2 3 history1 0.1 4.5	 history2
	Sodium Potassium INFRA-RED Soot % Nitration Sulfation	ppm ppm ppm % Abs/cm Abs/.1mm	ASTM D5185m ASTM D5185m ASTM D5185m method *ASTM D7844 *ASTM D7624 *ASTM D7415	>25 >20 limit/base >4 >20 >30	8 3 4 <u>current</u> 0.5 8.3 20.3	29 2 3 history1 0.1 4.5 17.6	 history2
	Sodium Potassium INFRA-RED Soot % Nitration Sulfation FLUID DEGRAI	ppm ppm ppm % Abs/cm Abs/cm Abs/1mm	ASTM D5185m ASTM D5185m ASTM D5185m *ASTM D7844 *ASTM D7844 *ASTM D7624 *ASTM D7415	>25 >20 limit/base >4 >20 >30 limit/base	8 3 4 current 0.5 8.3 20.3 current	29 2 3 history1 0.1 4.5 17.6 history1	 history2 history2



DIAGNOSIS

monitor.

Contamination

Fluid Condition

oil.

Recommendation

Oil and filter change at the time of sampling has been noted. No corrective action is recommended at this time. Resample at the next service interval to

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). All other component wear rates are normal.

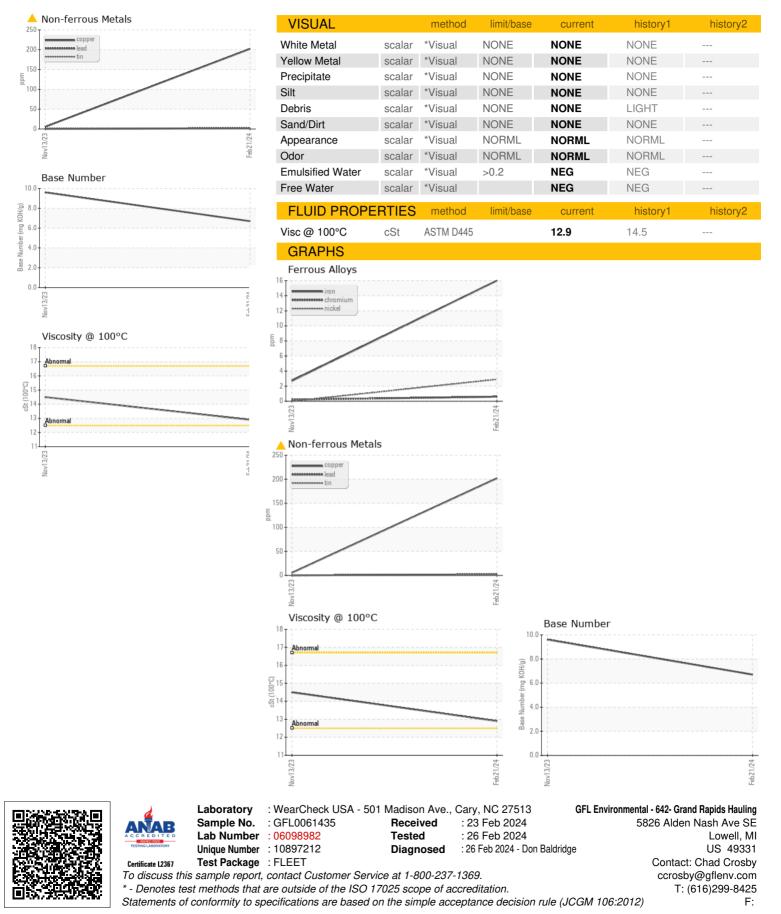
There is no indication of any contamination in the

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 ANALYSIS REPORT



Submitted By: BRITTANY FLINN