

OIL ANALYSIS REPORT

Sample Rating Trend





412019 MACK GR64B

Diesel Engine

PETRO CANADA DURON SHP 15W40 (--- GAL)

DIAGNOSIS	

Recommendation

Resample at the next service interval to monitor.

Wear

Metal levels are typical for a new component breaking in.

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.

(,	May2022	Jun2022 Sep2022	Feb2023 Apr2023	Sep2023	
SAMPLE INFORM	MATION	method				history2
Sample Number		Client Info		GFL0089274	GFL0056716	GFL0056658
Sample Date		Client Info		01 Sep 2023	28 Apr 2023	10 Feb 2023
Machine Age	hrs	Client Info		4053	3116	2420
Oil Age	hrs	Client Info		937	696	1262
Oil Changed		Client Info		Changed	Changed	Changed
Sample Status				NORMAL	NORMAL	NORMAL
CONTAMINAT	ION	method	limit/base	current	history1	history2
Fuel		WC Method	>3.0	<1.0	<1.0	<1.0
Glycol		WC Method		NEG	NEG	NEG
WEAR METAL	S	method	limit/base	current	history1	history2
Iron	ppm	ASTM D5185m	>120	15	8	11
Chromium	ppm	ASTM D5185m	>20	<1	0	<1
Nickel	ppm	ASTM D5185m	>5	<1	<1	1
Titanium	ppm	ASTM D5185m	>2	0	0	0
Silver	ppm	ASTM D5185m	>2	0	0	0
Aluminum	ppm	ASTM D5185m	>20	4	2	3
Lead	ppm	ASTM D5185m	>40	0	0	<1
Copper	ppm	ASTM D5185m	>330	9	7	17
Tin	ppm	ASTM D5185m	>15	<1	<1	1
Vanadium	ppm	ASTM D5185m		0	0	0
Cadmium	ppm	ASTM D5185m		0	0	0
ADDITIVES		method	limit/base	current	history1	history2
ADDITIVES Boron	ppm	method ASTM D5185m	limit/base 0	current 4	history1 4	history2 5
	ppm ppm		0			
Boron		ASTM D5185m	0	4	4	5
Boron Barium	ppm	ASTM D5185m ASTM D5185m	0 0 60	4 0	4 0	5 0
Boron Barium Molybdenum	ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m	0 0 60	4 0 66	4 0 62	5 0 58
Boron Barium Molybdenum Manganese	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	0 0 60 0	4 0 66 <1	4 0 62 <1	5 0 58 <1
Boron Barium Molybdenum Manganese Magnesium	ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	0 0 60 0 1010	4 0 66 <1 1027	4 0 62 <1 1009	5 0 58 <1 828
Boron Barium Molybdenum Manganese Magnesium Calcium	ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	0 0 60 0 1010 1070	4 0 66 <1 1027 1157	4 0 62 <1 1009 1223	5 0 58 <1 828 1083
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus	ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	0 0 60 0 1010 1070 1150	4 0 66 <1 1027 1157 1060	4 0 62 <1 1009 1223 1014	5 0 58 <1 828 1083 942
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc	ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	0 0 60 0 1010 1070 1150 1270	4 0 66 <1 1027 1157 1060 1354	4 0 62 <1 1009 1223 1014 1330	5 0 58 <1 828 1083 942 1161
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur	ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	0 0 60 0 1010 1070 1150 1270 2060	4 0 66 <1 1027 1157 1060 1354 3406	4 0 62 <1 1009 1223 1014 1330 3405	5 0 58 <1 828 1083 942 1161 2666
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	0 0 60 1010 1070 1150 1270 2060 limit/base	4 0 66 <1 1027 1157 1060 1354 3406 current	4 0 62 <1 1009 1223 1014 1330 3405 history1	5 0 58 <1 828 1083 942 1161 2666 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon	ppm ppm ppm ppm ppm ppm ppm ppm TS	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	0 0 60 1010 1070 1150 1270 2060 limit/base	4 0 66 <1 1027 1157 1060 1354 3406 <u>current</u> 4	4 0 62 <1 1009 1223 1014 1330 3405 history1 3	5 0 58 <1 828 1083 942 1161 2666 history2 3
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon Sodium	ppm ppm ppm ppm ppm ppm ppm ppm TS	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	0 0 60 0 1010 1070 1150 1270 2060 limit/base >25	4 0 66 <1 1027 1157 1060 1354 3406 <u>current</u> 4 5	4 0 62 <1 1009 1223 1014 1330 3405 history1 3 2	5 0 58 <1 828 1083 942 1161 2666 history2 3 4
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon Sodium Potassium	ppm ppm ppm ppm ppm ppm ppm ppm TS	ASTM D5185m ASTM D5185m	0 0 60 0 1010 1070 1150 1270 2060 limit/base >25	4 0 66 <1 1027 1157 1060 1354 3406 <u>current</u> 4 5 10	4 0 62 <1 1009 1223 1014 1330 3405 history1 3 2 5	5 0 58 <1 828 1083 942 1161 2666 history2 3 4 9
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon Sodium Potassium INFRA-RED Soot %	ppm ppm ppm ppm ppm ppm ppm ppm TS ppm ppm	ASTM D5185m ASTM D5185m	0 0 0 1010 1070 1150 1270 2060 limit/base >25 	4 0 66 <1 1027 1157 1060 1354 3406 <u>current</u> 4 5 10 <u>current</u> 0.5	4 0 62 <1 1009 1223 1014 1330 3405 history1 3 2 5 <u>history1</u> 0.3	5 0 58 <1 828 1083 942 1161 2666 history2 3 4 9 9 history2 0.3
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon Sodium Potassium INFRA-RED	ppm ppm ppm ppm ppm ppm ppm ppm TS ppm ppm	ASTM D5185m ASTM D5185m	0 0 0 1010 1070 1150 1270 2060 limit/base >25 >20 limit/base	4 0 66 <1 1027 1157 1060 1354 3406 <u>current</u> 4 5 10 <u>current</u>	4 0 62 <1 1009 1223 1014 1330 3405 history1 3 2 5 5	5 0 58 <1 828 1083 942 1161 2666 history2 3 4 9 9
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon Sodium Potassium INFRA-RED Soot % Nitration	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	0 0 0 1010 1070 1150 1270 2060 imit/base >25 20 imit/base >20	4 0 66 <1 1027 1157 1060 1354 3406 <i>current</i> 4 5 10 <i>current</i> 0.5 8.5	4 0 62 <1 1009 1223 1014 1330 3405 history1 3 2 5 <u>history1</u> 0.3 7.3	5 0 58 <1 828 1083 942 1161 2666 history2 3 4 9 history2 0.3 8.6
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon Sodium Potassium INFRA-RED Soot % Nitration Sulfation	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	0 0 0 1010 1070 1150 1270 2060 imit/base >25 	4 0 66 <1 1027 1157 1060 1354 3406 <u>current</u> 4 5 10 <u>current</u> 0.5 8.5 20.9	4 0 62 <1 1009 1223 1014 1330 3405 history1 3 2 5 <u>history1</u> 0.3 7.3 17.3	5 0 58 <1 828 1083 942 1161 2666 history2 3 4 9 history2 0.3 8.6 19.0
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINAN Silicon Sodium Potassium INFRA-RED Soot % Nitration Sulfation FLUID DEGRAE	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D7844 *ASTM D7844 *ASTM D7844	0 0 0 1010 1070 1150 1270 2060 imit/base >25 imit/base >4 >20 30 imit/base >30	4 0 66 <1 1027 1157 1060 1354 3406 <i>current</i> 4 5 10 <i>current</i> 0.5 8.5 20.9	4 0 62 <1 1009 1223 1014 1330 3405 history1 3 2 5 history1 0.3 7.3 17.3 history1	5 0 58 <1 828 1083 942 1161 2666 history2 3 4 9 history2 0.3 8.6 19.0 history2



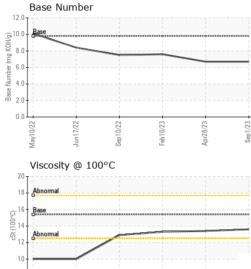
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May10/22

OIL ANALYSIS REPORT

VISUAL



Jun17/22

	Laboratory Sample No.		501 Madison Ave., Cary, NC 27513 Received : 05 Sep 2023 Diagnosed : 06 Sep 2023 Diagnostician : Wes Davis <i>vice at 1-800-237-1369.</i>				GFL Environmental - 001 - Raleigh(CNC 3741 Conquest Driv Garner, Nr US 2752 Contact: Craig Johnso craig.johnson@gflenv.cor		
		11 12 2701/veW	Feb 10/23 +	Apr28/23	2	May10/22	Sep10/22	Apr28/23 - Seo 1/23 -	
		6 15 0 14 14 13 12 Abnormal			Base Number (mg KOH/g) 6 0 0 0				
		Viscosity @ 100°C			12 10				
		May10/22		Apr28/23	Sep 1/23				
		150 100 50							
		200 copper 200 lead							
		Non-ferrous Metal		Apr28/23	Sep1/23				
		臣20 15 10 5		\checkmark	/				
Sep10/22 -	Apr28/23 -	35 30 25							
		GRAPHS Ferrous Alloys							
		FLUID PROPE Visc @ 100°C	cSt	method ASTM D445	limit/base	current 13.6	history1 13.4	history2 13.3	
		Emulsified Water Free Water	scalar scalar	*Visual *Visual	>0.2	NEG NEG	NEG NEG	NEG NEG	
Sep10/22 Feb10/23	Apr28/23 Sep 1/23	Odor	scalar	*Visual	NORML	NORML	NORML	NORML	
)/22	//23	Sand/Dirt Appearance	scalar scalar	*Visual *Visual	NONE NORML	NONE NORML	NONE NORML	NONE NORML	
		Silt Debris	scalar scalar	*Visual *Visual	NONE NONE	NONE NONE	NONE NONE	NONE NONE	
		Precipitate	scalar	*Visual	NONE	NONE		NONE	
		Yellow Metal	scalar	*Visual	NONE	NONE	NONE NONE	NONE	

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Submitted By: Craig Johnson

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