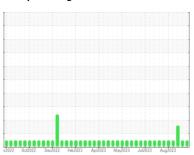


OIL ANALYSIS REPORT

Sample Rating Trend



NORMAL



LGS00180

Component

Middle Biogas Engine

CITGO PACEMAKER GAS ENGINE LFG LA 40 (--- 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 AN level is acceptable for this fluid. The condition of the oil is suitable for further service.

Fuel	40 (GAL)		n2022 Oct20	22 Dec2022 Feb2023	Apr2023 May2023 Jul2023	Aug2023	
Sample Date	SAMPLE INFORM	MATION	method	limit/base	current	history1	history2
Sample Date	Sample Number		Client Info		WC0803443	WC0803440	WC0803441
Machine Age hrs	•		Client Info		19 Sep 2023	17 Sep 2023	05 Sep 2023
Oil Age hrs Client Info 265 99 456 Oil Changed Client Info N/A N/A N/A N/A N/A Sample Status Client Info N/A N/A N/A N/A N/A N/A CONTAMINATION method limit/base current history1 history2 Fuel WC Method 94.0 <1.0 <1.0 <1.0 <1.0 Glycol WC Method 94.0 <1.0 <1.0 <1.0 <1.0 Glycol WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >45 4 6 6 6 Chromium ppm ASTM D5185m >2 <1 <1 0 <1 Chromium ppm ASTM D5185m >5 0 0 0 <1 Titanium ppm ASTM D5185m >5 1 <1 2 <1	•	hrs	Client Info		-		
Oil Changed Sample Status Client Info N/A N/A N/A ABNORMAL ABNORM		hrs	Client Info		265	99	456
CONTAMINATION	-		Client Info		N/A	N/A	N/A
Fuel	Sample Status				NORMAL	NORMAL	ABNORMAL
WEAR METALS	CONTAMINATIO	N	method	limit/base	current	history1	history2
WEAR METALS	Fuel		WC Method	>4.0	<1.0	<1.0	<1.0
Iron	Glycol		WC Method		NEG	NEG	NEG
Chromium ppm ASTM D5185m >2 <1 <1 0 Nickel ppm ASTM D5185m >2 0 0 <1 Titanium ppm ASTM D5185m >5 0 0 0 Siliver ppm ASTM D5185m >5 0 0 0 Aluminum ppm ASTM D5185m >5 0 0 0 Aluminum ppm ASTM D5185m >10 4 3 <1 2 Lead ppm ASTM D5185m >1 4 2 <1 1 2 Copper ppm ASTM D5185m 0 0 0 <1 1 Tin ppm ASTM D5185m 0 0 0 <1 Cadadium ppm ASTM D5185m 0 0 0 <0 Barium ppm ASTM D5185m 0 0 0 <0 Molybdenum ppm <	WEAR METALS		method	limit/base	current	history1	history2
Nickel	Iron	ppm	ASTM D5185m	>45	4	6	6
Description	Chromium	ppm	ASTM D5185m	>2	<1	<1	0
Silver	Nickel	ppm	ASTM D5185m	>2	0	0	<1
Aluminum ppm ASTM D5185m >10 4 3 <1 Lead ppm ASTM D5185m >5 <1	Titanium	ppm	ASTM D5185m		0	0	0
Lead ppm ASTM D5185m >5 <1 <1 2 Copper ppm ASTM D5185m >14 2 <1 1 Tin ppm ASTM D5185m >13 3 1 4 Vanadium ppm ASTM D5185m 0 0 0 <1 Cadmium ppm ASTM D5185m 0 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 0 0 0 0 Barium ppm ASTM D5185m 0 0 0 0 Barium ppm ASTM D5185m 3 3 3 3 Magnesium ppm ASTM D5185m 1 0 <1 1 0 <1 Calcium ppm ASTM D5185m 301 288 341 1 1 1 1 1 1 1 1	Silver	ppm	ASTM D5185m	>5	0	0	0
Copper ppm ASTM D5185m >14 2 <1 1 Tin ppm ASTM D5185m >13 3 1 4 Vanadium ppm ASTM D5185m 0 0 <1	Aluminum	ppm	ASTM D5185m	>10	4	3	<1
Tin	Lead	ppm	ASTM D5185m	>5	<1	<1	2
Vanadium ppm ASTM D5185m 0 0 <1 Cadmium ppm ASTM D5185m 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 0 0 0 0 Barium ppm ASTM D5185m 0 0 0 0 Molybdenum ppm ASTM D5185m 3 3 3 Manganese ppm ASTM D5185m 1 0 <1 Magnesium ppm ASTM D5185m 30 28 42 Calcium ppm ASTM D5185m 301 288 341 Zinc ppm ASTM D5185m 349 371 419 Sulfur ppm ASTM D5185m 3499 3346 4061 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 <t< td=""><td>Copper</td><td>ppm</td><td>ASTM D5185m</td><td>>14</td><th>2</th><td><1</td><td>1</td></t<>	Copper	ppm	ASTM D5185m	>14	2	<1	1
Cadmium ppm ASTM D5185m 0 0 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 0 0 0 Barium ppm ASTM D5185m 0 0 0 Molybdenum ppm ASTM D5185m 3 3 3 Manganese ppm ASTM D5185m 1 0 <1	Tin	ppm	ASTM D5185m	>13	3	1	4
ADDITIVES	Vanadium	ppm	ASTM D5185m		0	0	<1
Boron	Cadmium	ppm	ASTM D5185m		0	0	0
Barium ppm ASTM D5185m 0 0 0 Molybdenum ppm ASTM D5185m 3 3 3 Manganese ppm ASTM D5185m 1 0 <1 Magnesium ppm ASTM D5185m 30 28 42 Calcium ppm ASTM D5185m 1474 1412 1753 Phosphorus ppm ASTM D5185m 301 288 341 Zinc ppm ASTM D5185m 349 371 419 Sulfur ppm ASTM D5185m 3499 3346 4061 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >200 141 85 204 Sodium ppm ASTM D5185m >20 0 <1 <1 INFRA-RED method limit/base current history1 history2 Soot % "ASTM D7844 0	ADDITIVES		method	limit/base	current	history1	history2
Molybdenum ppm ASTM D5185m 3 3 3 Manganese ppm ASTM D5185m 1 0 <1	Boron	ppm	ASTM D5185m		0	0	0
Manganese ppm ASTM D5185m 1 0 <1 Magnesium ppm ASTM D5185m 30 28 42 Calcium ppm ASTM D5185m 1474 1412 1753 Phosphorus ppm ASTM D5185m 301 288 341 Zinc ppm ASTM D5185m 349 371 419 Sulfur ppm ASTM D5185m 3499 3346 4061 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >200 141 85 △ 204 Sodium ppm ASTM D5185m >20 0 <1	Barium	ppm	ASTM D5185m		0	0	0
Magnesium ppm ASTM D5185m 30 28 42 Calcium ppm ASTM D5185m 1474 1412 1753 Phosphorus ppm ASTM D5185m 301 288 341 Zinc ppm ASTM D5185m 349 371 419 Sulfur ppm ASTM D5185m 3499 3346 4061 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >200 141 85 △ 204 Sodium ppm ASTM D5185m >20 0 <1	Molybdenum	ppm	ASTM D5185m		3	3	3
Calcium ppm ASTM D5185m 1474 1412 1753 Phosphorus ppm ASTM D5185m 301 288 341 Zinc ppm ASTM D5185m 349 371 419 Sulfur ppm ASTM D5185m 3499 3346 4061 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >200 141 85 ▲ 204 Sodium ppm ASTM D5185m >20 0 <1	Manganese	ppm	ASTM D5185m		1	0	<1
Phosphorus ppm ASTM D5185m 301 288 341 Zinc ppm ASTM D5185m 349 371 419 Sulfur ppm ASTM D5185m 3499 3346 4061 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >200 141 85 ▲ 204 Sodium ppm ASTM D5185m >20 0 <1	Magnesium	ppm	ASTM D5185m		30	28	42
Zinc ppm ASTM D5185m 349 371 419 Sulfur ppm ASTM D5185m 3499 3346 4061 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >200 141 85 ▲ 204 Sodium ppm ASTM D5185m 3 <1	Calcium	ppm	ASTM D5185m		1474	1412	1753
Sulfur ppm ASTM D5185m 3499 3346 4061 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >200 141 85 ▲ 204 Sodium ppm ASTM D5185m 3 <1	Phosphorus	ppm	ASTM D5185m		301	288	341
CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >200 141 85 ▲ 204 Sodium ppm ASTM D5185m 3 <1	Zinc	ppm	ASTM D5185m		349	371	419
Silicon ppm ASTM D5185m >200 141 85 ▲ 204 Sodium ppm ASTM D5185m 3 <1 1 Potassium ppm ASTM D5185m >20 0 <1 <1 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0 0 0 Nitration Abs/cm *ASTM D7624 >20 3.9 4.1 4.7 Sulfation Abs/.1mm *ASTM D7415 >30 17.3 16.0 20.2 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 8.2 7.4 10.9 Acid Number (AN) mg KOH/g ASTM D8045 1.16 0.88 0.73 1.36	Sulfur	ppm	ASTM D5185m		3499	3346	4061
Sodium ppm ASTM D5185m 3 <1 1 Potassium ppm ASTM D5185m >20 0 <1 <1 INFRA-RED method limit/base current history1 history2 Soot % *ASTM D7844 0 0 0 Nitration Abs/cm *ASTM D7624 >20 3.9 4.1 4.7 Sulfation Abs/.1mm *ASTM D7415 >30 17.3 16.0 20.2 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 8.2 7.4 10.9 Acid Number (AN) mg KOH/g ASTM D8045 1.16 0.88 0.73 1.36	CONTAMINANTS	3	method	limit/base	current	history1	history2
Potassium ppm ASTM D5185m >20 0 <1 <1 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0 0 0 Nitration Abs/cm *ASTM D7624 >20 3.9 4.1 4.7 Sulfation Abs/.1mm *ASTM D7415 >30 17.3 16.0 20.2 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 8.2 7.4 10.9 Acid Number (AN) mg KOH/g ASTM D8045 1.16 0.88 0.73 1.36	Silicon	ppm	ASTM D5185m	>200	141	85	<u>^</u> 204
INFRA-RED	Sodium	ppm	ASTM D5185m		3	<1	1
Soot % % *ASTM D7844 0 0 0 Nitration Abs/cm *ASTM D7624 >20 3.9 4.1 4.7 Sulfation Abs/.1mm *ASTM D7415 >30 17.3 16.0 20.2 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 8.2 7.4 10.9 Acid Number (AN) mg KOH/g ASTM D8045 1.16 0.88 0.73 1.36	Potassium	ppm	ASTM D5185m	>20	0	<1	<1
Nitration Abs/cm *ASTM D7624 >20 3.9 4.1 4.7 Sulfation Abs/.1mm *ASTM D7415 >30 17.3 16.0 20.2 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 8.2 7.4 10.9 Acid Number (AN) mg KOH/g ASTM D8045 1.16 0.88 0.73 1.36	INFRA-RED		method	limit/base	current	history1	history2
Sulfation Abs/.1mm *ASTM D7415 >30 17.3 16.0 20.2 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 8.2 7.4 10.9 Acid Number (AN) mg KOH/g ASTM D8045 1.16 0.88 0.73 1.36	Soot %	%	*ASTM D7844		0	0	0
FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 8.2 7.4 10.9 Acid Number (AN) mg KOH/g ASTM D8045 1.16 0.88 0.73 1.36	Nitration	Abs/cm	*ASTM D7624	>20	3.9	4.1	4.7
Oxidation Abs/.1mm *ASTM D7414 >25 8.2 7.4 10.9 Acid Number (AN) mg KOH/g ASTM D8045 1.16 0.88 0.73 1.36	Sulfation	Abs/.1mm	*ASTM D7415	>30	17.3	16.0	20.2
Acid Number (AN) mg KOH/g ASTM D8045 1.16 0.88 0.73 1.36	FLUID DEGRADA	ATION	method	limit/base	current	history1	history2
. ,	Oxidation	Abs/.1mm	*ASTM D7414	>25	8.2	7.4	10.9
Base Number (BN) mg KOH/g ASTM D2896 5 3.48 3.44 2.43	Acid Number (AN)	ma KOH/a	ASTM D8045	1 16	0.00	0.73	1.36
	7 told 1 tallibol (7 ti t)	mg nomg	710 TW D00 T0	1.10	0.00	0.75	1.00



OIL ANALYSIS REPORT







Laboratory Sample No. Lab Number **Unique Number**

: 05959960 : 10661173 Test Package : MOB 2

10

: WC0803443

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 Received : 25 Sep 2023 : 26 Sep 2023 Diagnosed

: Sean Felton Diagnostician

Aug21/23

BLACK OAK 5054 HWY HH HARTVILLE, MO US 65667

Contact: CHIP MATHEWS

chip.mattews@cubedistrictenergy.com T:

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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