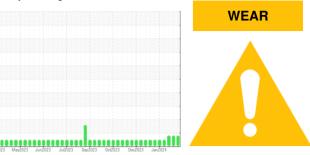


OIL ANALYSIS REPORT

Sample Rating Trend



Machine Id

LGS00180

Middle Biogas Engine

CITGO PACEMAKER GAS ENGINE LFG LA 40 (--- GAL)

DIAGNOSIS

Recommendation

No corrective action is recommended at this time. We recommend an early resample to monitor this condition.

Wear

The nickel level is abnormal. All other component wear rates are normal.

Contamination

There is no indication of any contamination in the

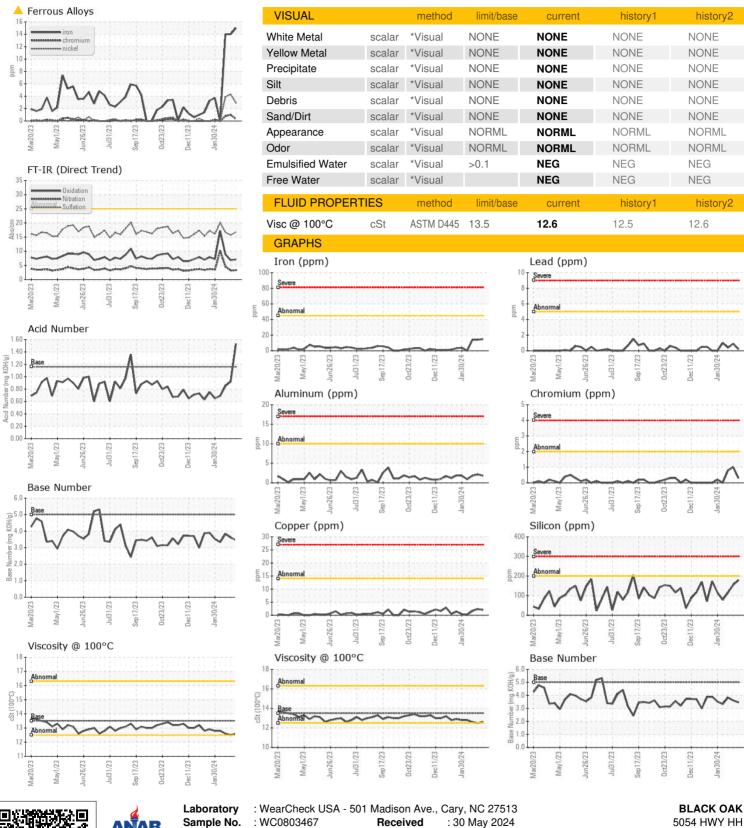
Fluid Condition

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.

Sample Number Client Info WC0803467 WC0803466 WC0803465 Sample Date Client Info Cli	40 (GAL)	AL) v2023 May/023 Jun2023 Jun2023 Sep2023 Oct2023 Dec2023 Jun2024						
Sample Date Client Info 28 May 2024 24 May 2024 20 May 2024	SAMPLE INFORM	MATION	method	limit/base	current	history1	history2	
Machine Age hrs Client Info 61660 61569 61477 Oil Age hrs Client Info 282 190 98 Oil Changed Client Info N/A N/A N/A N/A Sample Status Modern ABNORMAL A	Sample Number		Client Info		WC0803467	WC0803466	WC0803465	
Oil Changed	Sample Date		Client Info		28 May 2024	24 May 2024	20 May 2024	
Cilichanged Cilicht Info N/A ABNORMAL ABNORM	Machine Age	hrs	Client Info		61660	61569		
Oil Changed Client Info	Oil Age	hrs	Client Info		282	190	98	
ABNORMAL ABNORMAL ABNORMAL ABNORMAL CONTAMINATION method limit/base current history1 history2	-		Client Info		N/A	N/A	N/A	
Fuel WC Method >4.0	Sample Status				ABNORMAL	ABNORMAL	ABNORMAL	
Water WC Method >0.1 NEG NEG NEG Glycol WC Method Imit/base Current history1 history2 WEAR METALS method limit/base current history1 history2 Iron ppm ASTM DS185m >45 15 14 14 Chromium ppm ASTM DS185m >2 4 1 4 Nickel ppm ASTM DS185m >2 4 3 4 4 Titanium ppm ASTM DS185m >0 1 <1	CONTAMINATION	١	method	limit/base	current	history1	history2	
Glycol WC Method NEG NEG NEG WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >45 15 14 14 Chromium ppm ASTM D5185m >2 <1	Fuel		WC Method	>4.0	<1.0	<1.0	<1.0	
WEAR METALS method limit/base current history1 history2 Iron ppm ASTM D5185m >45 15 14 14 Chromium ppm ASTM D5185m >2 -1 1 -1 Nickel ppm ASTM D5185m >2 -3 4 4 Titanium ppm ASTM D5185m >5 0 1 -1 Aluminum ppm ASTM D5185m >10 2 2 2 Lead ppm ASTM D5185m >10 2 2 2 Lead ppm ASTM D5185m >14 2 2 2 Lead ppm ASTM D5185m >13 4 4 3 Vanadium ppm ASTM D5185m >13 4 4 3 Vanadium ppm ASTM D5185m 0 <1	Water		WC Method	>0.1	NEG	NEG	NEG	
Iron	Glycol		WC Method		NEG	NEG	NEG	
Chromium ppm ASTM D5185m >2 -1 1 <1 Nickel ppm ASTM D5185m >2 ▲ 3 ▲ 4 ▲ 4 Titanium ppm ASTM D5185m >2 ▲ 3 ▲ 4 ▲ 4 Silver ppm ASTM D5185m >5 0 1 <1	WEAR METALS		method	limit/base	current	history1	history2	
Nickel	Iron	ppm	ASTM D5185m	>45	15	14	14	
Titanium	Chromium	ppm	ASTM D5185m	>2	<1	1	<1	
Silver	Nickel	ppm	ASTM D5185m	>2	△ 3	<u>4</u>	<u>4</u>	
Aluminum	Titanium	ppm	ASTM D5185m		0	<1	<1	
Lead	Silver	ppm	ASTM D5185m	>5	0	1	<1	
Copper ppm ASTM D5185m >14 2 2 2 Tin ppm ASTM D5185m >13 4 4 3 Vanadium ppm ASTM D5185m <1	Aluminum	ppm	ASTM D5185m	>10	2	2	2	
Tin	Lead	ppm	ASTM D5185m	>5	<1	<1	<1	
Vanadium ppm ASTM D5185m <1 <1 <1 <1 <1 O ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 0 0 2 Barium ppm ASTM D5185m 0 0 0 Molybdenum ppm ASTM D5185m 2 4 4 Manganese ppm ASTM D5185m <1 <1 <1 <1 Magnesium ppm ASTM D5185m 21 31 35 Calcium ppm ASTM D5185m 307 284 313 Zinc ppm ASTM D5185m 3756 3340 3307 Sulfur ppm ASTM D5185m >200 179 155 116 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >20 179 155 116 S	Copper	ppm	ASTM D5185m	>14	2	2	2	
Cadmium ppm ASTM D5185m 0 <1 0 ADDITIVES method limit/base current history1 history2 Boron ppm ASTM D5185m 0 0 2 Barium ppm ASTM D5185m 0 0 0 Molybdenum ppm ASTM D5185m 2 4 4 Manganese ppm ASTM D5185m 21 31 35 Calcium ppm ASTM D5185m 1552 1328 1402 Phosphorus ppm ASTM D5185m 307 284 313 Zinc ppm ASTM D5185m 3756 3340 3307 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >200 179 155 116 Sodium ppm ASTM D5185m >20 0 2 2 INFRA-RED method limit/base cur	Tin	ppm	ASTM D5185m	>13	4	4	3	
ADDITIVES	Vanadium	ppm	ASTM D5185m		<1	<1	<1	
Boron	Cadmium	ppm	ASTM D5185m		0	<1	0	
Barium	ADDITIVES		method	limit/base	current	history1	history2	
Molybdenum ppm ASTM D5185m 2 4 4 Manganese ppm ASTM D5185m <1	Boron	ppm	ASTM D5185m		0	0	2	
Manganese ppm ASTM D5185m <1 <1 <1 Magnesium ppm ASTM D5185m 21 31 35 Calcium ppm ASTM D5185m 1552 1328 1402 Phosphorus ppm ASTM D5185m 307 284 313 Zinc ppm ASTM D5185m 390 337 375 Sulfur ppm ASTM D5185m 3756 3340 3307 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >200 179 155 116 Sodium ppm ASTM D5185m >20 0 2 2 Potassium ppm ASTM D5185m >20 0 2 2 INFRA-RED method limit/base current history1 history2 Soot % *ASTM D7844 0 0.1 0 Nitration Abs/:1mm *ASTM D7415	Barium	ppm	ASTM D5185m		0	0	0	
Magnesium ppm ASTM D5185m 21 31 35 Calcium ppm ASTM D5185m 1552 1328 1402 Phosphorus ppm ASTM D5185m 307 284 313 Zinc ppm ASTM D5185m 390 337 375 Sulfur ppm ASTM D5185m 3756 3340 3307 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >200 179 155 116 Sodium ppm ASTM D5185m >20 0 2 2 Potassium ppm ASTM D5185m >20 0 2 2 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0 0.1 0 Nitration Abs/.1mm *ASTM D7624 >20 3.3 3.2 4.6 Sulfation	Molybdenum	ppm	ASTM D5185m		2	4	4	
Calcium ppm ASTM D5185m 1552 1328 1402 Phosphorus ppm ASTM D5185m 307 284 313 Zinc ppm ASTM D5185m 390 337 375 Sulfur ppm ASTM D5185m 3756 3340 3307 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >200 179 155 116 Sodium ppm ASTM D5185m >20 0 2 2 Potassium ppm ASTM D5185m >20 0 2 2 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0 0.1 0 Nitration Abs/.mm *ASTM D7415 >30 16.8 15.7 16.7 FLUID DEGRADATION method limit/base current history1 history2	Manganese	ppm	ASTM D5185m		<1	<1	<1	
Phosphorus ppm ASTM D5185m 307 284 313 Zinc ppm ASTM D5185m 390 337 375 Sulfur ppm ASTM D5185m 3756 3340 3307 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >200 179 155 116 Sodium ppm ASTM D5185m >20 0 2 2 Potassium ppm ASTM D5185m >20 0 2 2 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0 0.1 0 Nitration Abs/cm *ASTM D7624 >20 3.3 3.2 4.6 Sulfation Abs/.1mm *ASTM D7415 >30 16.8 15.7 16.7 FLUID DEGRADATION method limit/base current history1 history2	Magnesium	ppm	ASTM D5185m		21	31	35	
Solifur ppm ASTM D5185m 390 337 375 3307 375 3340 3307 3307 3756 3340 3307 33	Calcium	ppm	ASTM D5185m		1552	1328	1402	
Sulfur ppm ASTM D5185m 3756 3340 3307 CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >200 179 155 116 Sodium ppm ASTM D5185m <1	Phosphorus	ppm	ASTM D5185m		307	284	313	
CONTAMINANTS method limit/base current history1 history2 Silicon ppm ASTM D5185m >200 179 155 116 Sodium ppm ASTM D5185m <1	Zinc	ppm	ASTM D5185m		390	337	375	
Silicon ppm ASTM D5185m >200 179 155 116 Sodium ppm ASTM D5185m <1 <1 0 Potassium ppm ASTM D5185m >20 0 2 2 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0 0.1 0 Nitration Abs/cm *ASTM D7624 >20 3.3 3.2 4.6 Sulfation Abs/.1mm *ASTM D7415 >30 16.8 15.7 16.7 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 7.1 6.8 8.9 Acid Number (AN) mg KOH/g ASTM D8045 1.16 1.53 0.92 0.85	Sulfur	ppm	ASTM D5185m		3756	3340	3307	
Sodium ppm ASTM D5185m <1	CONTAMINANTS		method	limit/base	current	history1	history2	
Potassium ppm ASTM D5185m >20 0 2 2 INFRA-RED method limit/base current history1 history2 Soot % % *ASTM D7844 0 0.1 0 Nitration Abs/cm *ASTM D7624 >20 3.3 3.2 4.6 Sulfation Abs/.1mm *ASTM D7415 >30 16.8 15.7 16.7 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 7.1 6.8 8.9 Acid Number (AN) mg KOH/g ASTM D8045 1.16 1.53 0.92 0.85	Silicon	ppm	ASTM D5185m	>200	179	155	116	
INFRA-RED	Sodium	ppm	ASTM D5185m		<1	<1	0	
Soot % *ASTM D7844 0 0.1 0 Nitration Abs/cm *ASTM D7624 >20 3.3 3.2 4.6 Sulfation Abs/.1mm *ASTM D7415 >30 16.8 15.7 16.7 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 7.1 6.8 8.9 Acid Number (AN) mg KOH/g ASTM D8045 1.16 1.53 0.92 0.85	Potassium	ppm	ASTM D5185m	>20	0	2	2	
Nitration Abs/cm *ASTM D7624 >20 3.3 3.2 4.6 Sulfation Abs/.1mm *ASTM D7415 >30 16.8 15.7 16.7 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 7.1 6.8 8.9 Acid Number (AN) mg KOH/g ASTM D8045 1.16 1.53 0.92 0.85	INFRA-RED		method	limit/base	current	history1	history2	
Sulfation Abs/.1mm *ASTM D7415 >30 16.8 15.7 16.7 FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 7.1 6.8 8.9 Acid Number (AN) mg KOH/g ASTM D8045 1.16 1.53 0.92 0.85	Soot %	%	*ASTM D7844		0	0.1	0	
FLUID DEGRADATION method limit/base current history1 history2 Oxidation Abs/.1mm *ASTM D7414 >25 7.1 6.8 8.9 Acid Number (AN) mg KOH/g ASTM D8045 1.16 1.53 0.92 0.85	Nitration	Abs/cm	*ASTM D7624	>20	3.3	3.2	4.6	
Oxidation Abs/.1mm *ASTM D7414 >25 7.1 6.8 8.9 Acid Number (AN) mg KOH/g ASTM D8045 1.16 1.53 0.92 0.85	Sulfation	Abs/.1mm	*ASTM D7415	>30	16.8	15.7	16.7	
Acid Number (AN) mg KOH/g ASTM D8045 1.16 1.53 0.92 0.85	FLUID DEGRADA	TION	method	limit/base	current	history1	history2	
Acid Number (AN) mg KOH/g ASTM D8045 1.16 1.53 0.92 0.85	Oxidation	Abs/.1mm	*ASTM D7414	>25	7.1	6.8	8.9	
	Base Number (BN)	mg KOH/g	ASTM D2896	5	3.46	3.61	3.83	



OIL ANALYSIS REPORT





Certificate 12367

Sample No.

: WC0803467 Lab Number : 06196019 Unique Number : 11058142

Test Package : MOB 2

Received **Tested** : 02 Jun 2024

Diagnosed : 02 Jun 2024 - Don Baldridge

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.

Statements of conformity to specifications are based on the simple acceptance decision rule (JCGM 106:2012)

T: F:

HARTVILLE, MO

Contact: CHIP MATHEWS

chip.mattews@cubedistrictenergy.com

US 65667