

# **OIL ANALYSIS REPORT**







## Machine Id Grand River CAT 1 GRRM01BE Biogas Engine

CHEVRON HDAX 9500 GAS ENGINE OIL 40 (90 GAL)

SAMPLE INFORMATION method

\*



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.

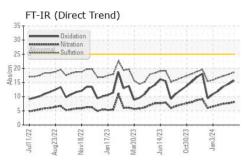
#### Fluid Condition

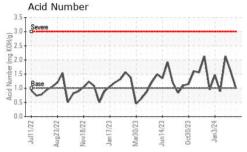
The BN result indicates that there is suitable alkalinity remaining in the oil. The AN level is acceptable for this fluid. The condition of the oil is suitable for further service.

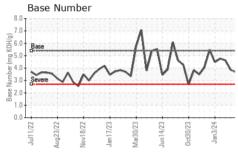
		method	iiiiii/base	current	TIIStOLA	mstoryz
Sample Number		Client Info		WC0724921	WC0724924	WC0724872
Sample Date		Client Info		17 Apr 2024	08 Apr 2024	27 Mar 2024
Machine Age	hrs	Client Info		72412	72196	71983
Oil Age	hrs	Client Info		1250	1063	810
Oil Changed		Client Info		Not Changd	Not Changd	Not Changd
Sample Status				NORMAL	NORMAL	NORMAL
•				-	NOTIWITE	NOTIVIZE
CONTAMINATIO	Ν	method	limit/base	current	history1	history2
Fuel		WC Method	>4.0	<1.0	<1.0	<1.0
Water		WC Method	>.11	NEG	NEG	NEG
Glycol		WC Method		NEG	NEG	NEG
WEAR METALS		mathad	limit/bass	ourroot	biotomd	history ()
		method	limit/base	current	history1	history2
Iron	ppm	ASTM D5185m	>15	2	3	3
Chromium	ppm	ASTM D5185m	>4	0	<1	0
Nickel	ppm	ASTM D5185m		0	<1	<1
Titanium	ppm	ASTM D5185m		0	<1	0
Silver	ppm	ASTM D5185m		0	0	0
Aluminum	ppm	ASTM D5185m	>6	1	2	1
Lead	ppm	ASTM D5185m	>9	2	2	<1
Copper	ppm	ASTM D5185m	>6	2	2	2
Tin	ppm	ASTM D5185m	>4	2	2	0
Vanadium	ppm	ASTM D5185m		<1	<1	0
Cadmium	ppm	ASTM D5185m		0	<1	0
ADDITIVES		method	limit/base	current	history1	history2
Boron	ppm	ASTM D5185m		0	<1	2
Barium	ppm	ASTM D5185m		0	0	0
Molybdenum	ppm	ASTM D5185m		2	3	3
Manganese	ppm	ASTM D5185m		<1	<1	0
Manganesium	ppm	ASTM D5185m		9	11	14
Calcium		ASTM D5185m		9 1928	1976	1941
	ppm	ASTM D5185m		267	313	278
Phosphorus Zinc	ppm	ASTM D5185m		303	370	343
Sulfur	ppm	ASTM D5185m		1869	2124	2131
	ppm	ASTIVI DOTODITI		1009	2124	2131
CONTAMINANTS		method	limit/base	current	history1	history2
Silicon	ppm	ASTM D5185m	>181	46	43	32
Sodium	ppm	ASTM D5185m	>21	2	1	1
Potassium	ppm	ASTM D5185m	>20	0	2	0
INFRA-RED		method	limit/base	current	history1	history2
Soot %	%	*ASTM D7844		0	0	0
Nitration	Abs/cm	*ASTM D7624		8.1	7.7	7.5
Sulfation	Abs/.1mm	*ASTM D7415		18.6	17.9	17.3
FLUID DEGRADA			limit/base			
		method	mmbase		history1	history2
Oxidation	Abs/.1mm	*ASTM D7414	1.0	15.7	14.5	13.6
Acid Number (AN)	mg KOH/g	ASTM D8045		1.01	1.60	2.13
Base Number (BN)	mg KOH/g	ASTM D2896	5.4	3.67	3.86	4.62
5:24:37) Rev: 1					Submitted By	: Paul Jaworsky

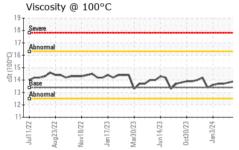


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VISUAL		method	limit/base	current	history1	history
White Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Yellow Metal	scalar	*Visual	NONE	NONE	NONE	NONE
Precipitate	scalar	*Visual	NONE	NONE	NONE	NONE
Silt	scalar	*Visual	NONE	NONE	NONE	NONE
Debris	scalar	*Visual	NONE	NONE	NONE	LIGHT
Sand/Dirt	scalar	*Visual	NONE	NONE	NONE	NONE
Appearance	scalar	*Visual	NORML	NORML	NORML	NORML
Odor	scalar	*Visual	NORML	NORML	NORML	NORML
Emulsified Water	scalar	*Visual	>.11	NEG	NEG	NEG
Free Water	scalar	*Visual		NEG	NEG	NEG
FLUID PROPER	TIES	method	limit/base	current	history1	history
/isc @ 100°C	cSt	ASTM D445	13.4	13.9	13.8	13.7
GRAPHS						
Iron (ppm)			15	Lead (ppm)		
Severe				Severe		x
Abnormal			10 E	- Abnormal		A
			und S			
		<u> </u>	0	A	$-\Lambda$	1_A
322			0			
Juli 1/22 Aug 23/22 Nov1 8/22	Mar30/23	Jun 14/23 Oct30/23	200	Juli 1/22 Aug 23/22 Nov 18/22	Jan 17/23 Mar30/23	Jan 3/24
Aluminum (ppm)		- U				
						- U
		110000000000000	6	Chromium (p		
T Severe			5	Chromium (p		
Abacmal			5	Chromium (p		
Severe			5	Chromium (p		
Abnormal	<u> </u>	۸ M	5 4 Ed 3 2 2	Chromium (p		
Abnormal	$\sim$	(23	5 4 4 4 3 2 2 1 0	Chromium (p	pm)	~~~
Abnormal	$\sim$	Juni 4/23 + + + + + + + + + + + + + + + + + + +	5 4 4 4 3 2 2 1 0	Chromium (p		~~~
Aug23222 Aug23222 Mov18/22	$\sim$	0ct30/23	5 4 4 4 3 2 2 1 0	Chromium (p Severe Abnormal ZZZ/11/In ZZZ/81/volv	bw)	<u>~~~</u>
Abnormal 22/1110 Copper (ppm)	$\sim$	0et30/23	5 4 4 4 3 2 2 1 0	Chromium (p	bw)	<u>~~~</u>
Abnormal Abnormal ZZI SI Non Copper (ppm)	$\sim$	Juni 4(23	5 4 1 2 2 1 0	Chromium (p	bw)	<u>~~~</u>
Abnormal Abnormal 227(1) 227(2) 277(2	$\sim$	0cc30/23	5 4 9 2 1 0 250 200 150	Chromium (p	bw)	<u>~~~</u>
Abnormal 22/1111 Copper (ppm)	$\sim$	0ct30/23	5 4 4 4 4 3 2 1 0 0 250 200	Chromium (p	bw)	<u>~~~</u>
Abnormal 27/111n Copper (ppm) Severe Abnormal	$\sim$	0e:30/23	250 200 200 200 200 200 200 200 200 200	Chromium (p	bw)	<u>~~~</u>
Abnormal 2271110 Copper (ppm) Severe Abnormal	Mar30/23	~	250 250 250 250 250 200 250 200 200 200	Chromium (p	pm)	0er30/23
Abnormal 2271110 Copper (ppm) Severe Abnormal	Mar30/23	~	250 250 250 250 250 200 250 200 200 200	Chromium (p	pm)	0er30/23
Aproximal Approximation 221110L Copper (ppm) Severe 222820uA 2228100N Severe 222820uA 2228100N Severe 222820uA 2228100N Severe S	Mar30/23	<u> </u>	250 250 250 250 250 200 250 200 200 200	Chromium (p Severe Abnormal 227111/n Silicon (ppm) Severe Silicon (ppm) Severe Silicon (ppm)	buu) Mar30/23	0er30/23
Abnormal ZZILIIN Viscosity @ 100°	Mar30/23	~	250 200 200 50 50 50 50 50 50 50 50 50 50 50 50 5	Chromium (p	buu) Mar30/23	0er30/23
Abnormal Abnormal 227111in Copper (ppm) Severe Viscosity @ 100°/	Mar30/23	~	250 200 200 50 50 50 50 50 50 50 50 50 50 50 50 5	Chromium (p	buu) Mar30/23	0er30/23
Abnormal Copper (ppm) Severe Copper (ppm) Severe Copper (ppm) Severe Copper (ppm) Severe Copper (ppm) Severe Copper (ppm) Severe Copper (ppm) Severe Copper (ppm) Severe	Mar30/23	~	250 200 200 50 50 50 50 50 50 50 50 50 50 50 50 5	Chromium (p	buu) Mar30/23	0er30/23
Abnormal Abnormal Copper (ppm) Severe Abnormal ZZ/LIUR Viscosity @ 100° Severe Abnormal	Mar30/23	~	250 200 200 50 50 50 50 50 50 50 50 50 50 50 50 5	Chromium (p	buu) Mar30/23	0er30/23 6r30/23 Jan3/24
Abnormal Abnormal Copper (ppm) Severe Abnormal ZZ/EZ <sup>bny</sup> ZZ/EZ <sup>bny</sup>	Mar30/23	~	5 4 4 4 4 4 4 2 2 1 0 250 200 4 1 0 250 200 100 50 0 0 0 0 0 0 0 0 0 0 0 0 0	Chromium (p	buu) Mar30/23	0er30/23 6r30/23 Jan3/24
Abnormal Copper (ppm) Copper (ppm) Copper (ppm) Copper (ppm) Copper (ppm) Severe Abnormal CZE2 <sup>Diny</sup> Copper (ppm) Severe Abnormal		~	250 200 200 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Chromium (p	buu) Mar30/23	0ct30/23 0ct

Laboratory : WearCheck USA - 501 Madison Ave., Cary, NC 27513 **EDL NA Recips-Grand River** Sample No. : WC0724921 Received : 19 Apr 2024 Grand River Powerstation, 8550 West Grand River Hwy Lab Number : 06154640 Tested : 23 Apr 2024 Grand Ledge, MI Unique Number : 10990063 Diagnosed : 23 Apr 2024 - Sean Felton US 48837 Test Package : MOB 2 Contact: JAMES ALEXANDER Certificate 12367 To discuss this sample report, contact Customer Service at 1-800-237-1369. james.alexander@edlenergy.com \* - Denotes test methods that are outside of the ISO 17025 scope of accreditation. T:

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

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