

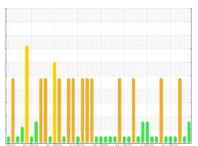
# **OIL ANALYSIS REPORT**



## Machine Id **Brent Run CAT 4 BRRM04BE**

Component **Biogas Engine** 

CHEVRON HDAX 6500 LFG GAS ENGINE OIL (--- GAL)



Sample Rating Trend



## **DIAGNOSIS**

#### Recommendation

No corrective action is recommended at this time. Resample at the next service interval to monitor. ( Customer Sample Comment: 400 hour sample after engine scrapping)

#### Wear

All component wear rates are normal.

#### Contamination

Elemental level of silicon (Si) above normal.

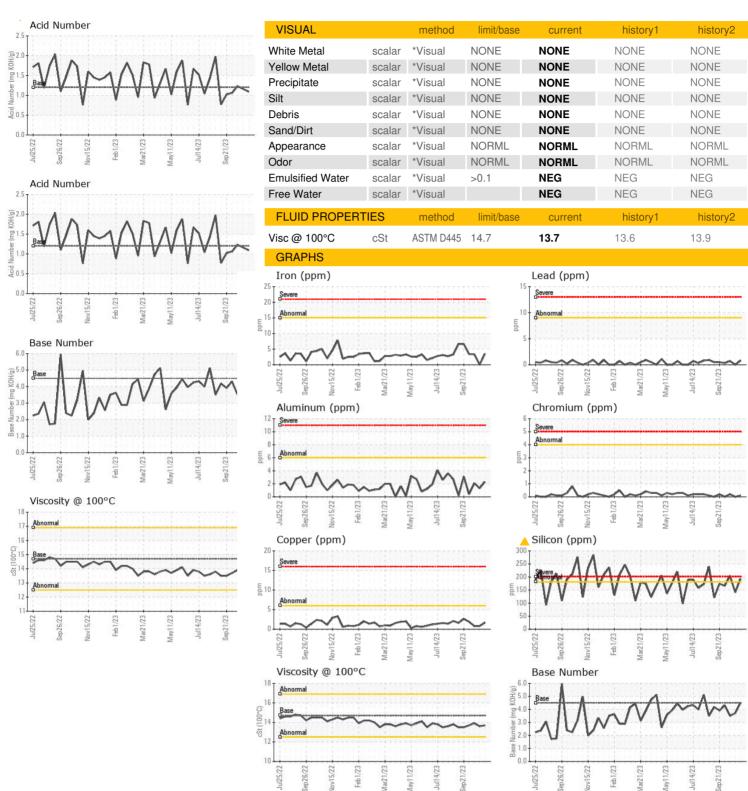
### **Fluid Condition**

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   WC0776793   WC0776759   WC07767775   Sample Date   Client Info   O5 Dec 2023   12 Oct 2023   12	GAS ENGINE OIL (	GAL)	12022 Sep20	22 Nov2022 Feb2023	Mar2023 May2023 Jul2023	Sep2023	
Sample Date	SAMPLE INFORM	MATION	method	limit/base	current	history1	history2
Machine Age   hrs   Client Info   104796   104166   103624   100169   1001600   10016000   10016000   10016000   10016000   10016000   10016000   10016000   10016000   10016000   10016000	Sample Number		Client Info		WC0776793	WC0776759	WC0776777
Oil Change	Sample Date		Client Info		05 Dec 2023	07 Nov 2023	12 Oct 2023
Cilient Info	Machine Age	hrs	Client Info		104796	104166	103624
ABNORMAL   SEVERE	Oil Age	hrs	Client Info		438	379	770
ABNORMAL   SEVERE	Oil Changed		Client Info		Not Changd	Not Changd	Not Changd
Fuel	Sample Status					NORMAL	SEVERE
Water         WC Method         >0.1         NEG         NEG         NEG           Glycol         WC Method         NEG         NEG         NEG           WEAR METALS         method         limit/base         current         history1         history2           Iron         ppm         ASTM DS185m         >15         4         0         3           Chromium         ppm         ASTM DS185m         >4         -1         0         -1           Nickel         ppm         ASTM DS185m         >2         1         0         -1           Titanium         ppm         ASTM DS185m         >2         1         0         0           Silver         ppm         ASTM DS185m         >6         2         1         2           Lead         ppm         ASTM DS185m         >9         <1         0         <1           Copper         ppm         ASTM DS185m         >9         <1         0         <1           Vanadium         ppm         ASTM DS185m         >9         <1         0         0         <1           ADDITIVES         method         limit/base         current         history1         history2	CONTAMINATION	N	method	limit/base	current	history1	history2
WEAR METALS	Fuel		WC Method	>4.0	<1.0	<1.0	<1.0
WEAR METALS	Water		WC Method	>0.1	NEG	NEG	NEG
Iron	Glycol		WC Method		NEG	NEG	NEG
Chromium         ppm         ASTM D5185m         >4         <1         0         <1           Nickel         ppm         ASTM D5185m         >2         1         0         <1	WEAR METALS		method	limit/base	current	history1	history2
Nickel	Iron	ppm	ASTM D5185m	>15	4	0	3
Silver	Chromium	ppm	ASTM D5185m	>4	<1	0	<1
Silver	Nickel		ASTM D5185m	>2	1	0	<1
Silver	Titanium		ASTM D5185m		<1	0	0
Aluminum   ppm   ASTM D5185m   >6   2   1   2				>5			
Lead         ppm         ASTM D5185m         >9         <1         0         <1           Copper         ppm         ASTM D5185m         >6         2         <1         <1           Tin         ppm         ASTM D5185m         >4         4         2         4           Vanadium         ppm         ASTM D5185m         0         0         0         0           Cadmium         ppm         ASTM D5185m         0         0         0         <1           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         2         5         1           Barium         ppm         ASTM D5185m         0         2         3           Molybdenum         ppm         ASTM D5185m         1         1         <1         <1           Magnesium         ppm         ASTM D5185m         3         24         14            Calcium         ppm         ASTM D5185m         1859         1597         1877           Phosphorus         ppm         ASTM D5185m         306         263         298           Zinc         ppm <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>							
Copper         ppm         ASTM D5185m         >6         2         <1         <1           Tin         ppm         ASTM D5185m         >4         4         2         4           Vanadium         ppm         ASTM D5185m         0         0         0         0           Cadmium         ppm         ASTM D5185m         0         0         <1							
Tin ppm ASTM D5185m >4							
Vanadium         ppm         ASTM D5185m         0         0         0           Cadmium         ppm         ASTM D5185m         0         0         <1           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         2         5         1           Barium         ppm         ASTM D5185m         0         2         3           Molybdenum         ppm         ASTM D5185m         1         1         <1         <1           Manganese         ppm         ASTM D5185m         3         24         14            Calcium         ppm         ASTM D5185m         1859         1597         1877           Phosphorus         ppm         ASTM D5185m         306         263         298           Zinc         ppm         ASTM D5185m         338         342         376           Sulfur         ppm         ASTM D5185m         2409         2340         3085           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >181							
Cadmium         ppm         ASTM D5185m         0         0         <1           ADDITIVES         method         limit/base         current         history1         history2           Boron         ppm         ASTM D5185m         2         5         1           Barium         ppm         ASTM D5185m         0         2         3           Molybdenum         ppm         ASTM D5185m         1         1         <1				<b>7</b> 4			
ADDITIVES					-		
Boron ppm ASTM D5185m 2 5 1  Barium ppm ASTM D5185m 0 2 3  Molybdenum ppm ASTM D5185m 1 1 1 <1  Manganese ppm ASTM D5185m 1 1 1 <1  Manganese ppm ASTM D5185m 24 14  Calcium ppm ASTM D5185m 8 24 14  Calcium ppm ASTM D5185m 1859 1597 1877  Phosphorus ppm ASTM D5185m 306 263 298  Zinc ppm ASTM D5185m 338 342 376  Sulfur ppm ASTM D5185m 2409 2340 3085  CONTAMINANTS method limit/base current history1 history2  Silicon ppm ASTM D5185m 0 1 1		ррпп					
Barium         ppm         ASTM D5185m         0         2         3           Molybdenum         ppm         ASTM D5185m         1         1         <1         <1           Manganese         ppm         ASTM D5185m          <1         <1         0           Magnesium         ppm         ASTM D5185m         8         24         14           Calcium         ppm         ASTM D5185m         1859         1597         1877           Phosphorus         ppm         ASTM D5185m         306         263         298           Zinc         ppm         ASTM D5185m         338         342         376           Sulfur         ppm         ASTM D5185m         2409         2340         3085           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >181         193         141         204           Sodium         ppm         ASTM D5185m         >20         1         <1         3           INFRA-RED         method         limit/base         current         history1         history2           Soot %         *ASTM D7				ilmit/base			
Molybdenum         ppm         ASTM D5185m         1         1         <1         <1         <1         <1         <1         <1         0           Magnesium         ppm         ASTM D5185m         <1	Boron	ppm					
Manganese         ppm         ASTM D5185m         <1         <1         0           Magnesium         ppm         ASTM D5185m         8         24         14           Calcium         ppm         ASTM D5185m         1859         1597         1877           Phosphorus         ppm         ASTM D5185m         306         263         298           Zinc         ppm         ASTM D5185m         338         342         376           Sulfur         ppm         ASTM D5185m         2409         2340         3085           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >181         193         141         204           Sodium         ppm         ASTM D5185m         >20         1         1         1           Potassium         ppm         ASTM D5185m         >20         1         <1         3           INFRA-RED         method         limit/base         current         history1         history2           Soot %         *ASTM D7844         0         0         0.1           Nitration         Abs/:mm         *ASTM D7745	Barium	ppm			0	2	3
Magnesium         ppm         ASTM D5185m         8         24         14           Calcium         ppm         ASTM D5185m         1859         1597         1877           Phosphorus         ppm         ASTM D5185m         306         263         298           Zinc         ppm         ASTM D5185m         338         342         376           Sulfur         ppm         ASTM D5185m         2409         2340         3085           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >181         193         141         204           Sodium         ppm         ASTM D5185m         0         <1         1           Potassium         ppm         ASTM D5185m         >20         1         <1         3           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         0         0         0.1           Nitration         Abs/.1mm         *ASTM D7624         >20         6.1         5.9         6.1           Sulfation         Abs/.1mm	•	ppm					
Calcium         ppm         ASTM D5185m         1859         1597         1877           Phosphorus         ppm         ASTM D5185m         306         263         298           Zinc         ppm         ASTM D5185m         338         342         376           Sulfur         ppm         ASTM D5185m         2409         2340         3085           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >181         193         141         204           Sodium         ppm         ASTM D5185m         0         <1	Manganese	ppm	ASTM D5185m		<1	<1	0
Phosphorus         ppm         ASTM D5185m         306         263         298           Zinc         ppm         ASTM D5185m         338         342         376           Sulfur         ppm         ASTM D5185m         2409         2340         3085           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >181         ▲ 193         141         ♠ 204           Sodium         ppm         ASTM D5185m         >1         ♠ 193         141         ♠ 204           Sodium         ppm         ASTM D5185m         >0         <1	Magnesium	ppm	ASTM D5185m		8	24	14
Zinc         ppm         ASTM D5185m         338         342         376           Sulfur         ppm         ASTM D5185m         2409         2340         3085           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >181         193         141         204           Sodium         ppm         ASTM D5185m         0         <1         1           Potassium         ppm         ASTM D5185m         >20         1         <1         3           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         0         0         0.1           Nitration         Abs/.mm         *ASTM D7624         >20         6.1         5.9         6.1           Sulfation         Abs/.1mm         *ASTM D7415         >30         21.3         20.2         21.9           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         14.1         12.4 <th< td=""><td>Calcium</td><td>ppm</td><td>ASTM D5185m</td><td></td><td>1859</td><td>1597</td><td>1877</td></th<>	Calcium	ppm	ASTM D5185m		1859	1597	1877
Sulfur         ppm         ASTM D5185m         2409         2340         3085           CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >181         193         141         204           Sodium         ppm         ASTM D5185m         0         <1	Phosphorus	ppm	ASTM D5185m		306	263	298
CONTAMINANTS         method         limit/base         current         history1         history2           Silicon         ppm         ASTM D5185m         >181         ▲ 193         141         ♠ 204           Sodium         ppm         ASTM D5185m         0         <1	Zinc	ppm	ASTM D5185m		338	342	376
Silicon         ppm         ASTM D5185m         >181         ▲ 193         141         ♠ 204           Sodium         ppm         ASTM D5185m         0         <1         1           Potassium         ppm         ASTM D5185m         >20         1         <1         3           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         0         0         0.1           Nitration         Abs/cm         *ASTM D7624         >20         6.1         5.9         6.1           Sulfation         Abs/.1mm         *ASTM D7415         >30         21.3         20.2         21.9           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         14.1         12.4         14.8           Acid Number (AN)         mg KOH/g         ASTM D8045         1.2         1.09         1.16         1.23	Sulfur	ppm	ASTM D5185m		2409	2340	3085
Sodium         ppm         ASTM D5185m         0         <1         1           Potassium         ppm         ASTM D5185m         >20         1         <1	CONTAMINANTS	3	method	limit/base	current	history1	history2
Potassium         ppm         ASTM D5185m         >20         1         <1         3           INFRA-RED         method         limit/base         current         history1         history2           Soot %         %         *ASTM D7844         0         0         0.1           Nitration         Abs/cm         *ASTM D7624         >20         6.1         5.9         6.1           Sulfation         Abs/.1mm         *ASTM D7415         >30         21.3         20.2         21.9           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         14.1         12.4         14.8           Acid Number (AN)         mg KOH/g         ASTM D8045         1.2         1.09         1.16         1.23	Silicon	ppm	ASTM D5185m	>181	<u> </u>	141	204
INFRA-RED	Sodium	ppm	ASTM D5185m		0	<1	1
Soot %         *ASTM D7844         0         0         0.1           Nitration         Abs/cm         *ASTM D7624         >20         6.1         5.9         6.1           Sulfation         Abs/.1mm         *ASTM D7415         >30         21.3         20.2         21.9           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         14.1         12.4         14.8           Acid Number (AN)         mg KOH/g         ASTM D8045         1.2         1.09         1.16         1.23	Potassium	ppm	ASTM D5185m	>20	1	<1	3
Nitration         Abs/cm         *ASTM D7624         >20         6.1         5.9         6.1           Sulfation         Abs/.1mm         *ASTM D7415         >30         21.3         20.2         21.9           FLUID DEGRADATION method limit/base current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         14.1         12.4         14.8           Acid Number (AN)         mg KOH/g         ASTM D8045         1.2         1.09         1.16         1.23	INFRA-RED		method	limit/base	current	history1	history2
Sulfation         Abs/.1mm         *ASTM D7415         >30         21.3         20.2         21.9           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         14.1         12.4         14.8           Acid Number (AN)         mg KOH/g         ASTM D8045         1.2         1.09         1.16         1.23	Soot %	%	*ASTM D7844		0	0	0.1
Sulfation         Abs/.1mm         *ASTM D7415         >30         21.3         20.2         21.9           FLUID DEGRADATION         method         limit/base         current         history1         history2           Oxidation         Abs/.1mm         *ASTM D7414         >25         14.1         12.4         14.8           Acid Number (AN)         mg KOH/g         ASTM D8045         1.2         1.09         1.16         1.23	Nitration	Abs/cm	*ASTM D7624	>20	6.1	5.9	6.1
Oxidation         Abs/.1mm         *ASTM D7414         >25         14.1         12.4         14.8           Acid Number (AN)         mg KOH/g         ASTM D8045         1.2         1.09         1.16         1.23	Sulfation						21.9
Acid Number (AN)         mg KOH/g         ASTM D8045         1.2         1.09         1.16         1.23	FLUID DEGRADA	ATION	method	limit/base	current	history1	history2
Acid Number (AN)         mg KOH/g         ASTM D8045         1.2         1.09         1.16         1.23	Oxidation	Abs/.1mm	*ASTM D7414	>25	14.1	12.4	14.8
	Base Number (BN)	mg KOH/g	ASTM D2896	4.5	4.50	3.71	3.50



# **OIL ANALYSIS REPORT**







Certificate L2367

Laboratory Sample No.

Lab Number **Unique Number** Test Package

: WC0776793 : 06029561 : 10779352 : MOB 2

: WearCheck USA - 501 Madison Ave., Cary, NC 27513 : 08 Dec 2023 Received : 12 Dec 2023

Diagnosed Diagnostician

: Don Baldridge

**EDL NA Recips-Brent Run** Brent Run Power Station, 8383 Vienna Road

Montrose, MI US 48457-9141

Contact: Rob Stewart

Rob.Stewart@energydevelopments.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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