

OIL ANALYSIS REPORT

10212 Fe2023 Met2023 Met2023 Sep2023 Sep2023 Jud024

Sample Rating Trend



Component Biogas Engine

CHEVRON HDAX 9500 GAS ENGINE OIL 40 (--- GAL)

Brent Run CAT 1 BRRM01BE

SAMPLE INFOR	MATION	method	limit/base	current	history1	history2
Sample Number		Client Info		WC0776702	WC0776736	WC0776730
Sample Date		Client Info		20 Feb 2024	09 Feb 2024	01 Feb 2024
Machine Age	hrs	Client Info		41236	40959	40798
Oil Age	hrs	Client Info		740	463	306
Oil Changed		Client Info		Not Changd	Not Changd	Not Change
Sample Status				SEVERE	SEVERE	NORMAL
CONTAMINATIO	N	method	limit/base	current	history1	history2
Fuel		WC Method	>4.0	<1.0	<1.0	<1.0
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 D5185m	>15	3	3	2
Chromium	ppm	ASTM D5185m	>4	0	<1	0
Nickel	ppm	ASTM D5185m	>2	<1	0	0
Titanium	ppm	ASTM D5185m		0	<1	0
Silver	ppm	ASTM D5185m	>5	0	0	0
Aluminum	ppm	ASTM D5185m	>6	3	1	3
Lead	ppm	ASTM D5185m	>9	2	1	2
Copper	ppm	ASTM D5185m	>6	2	2	2
Tin	ppm	ASTM D5185m	>4	4	4	3
Vanadium	ppm	ASTM D5185m		0	0	<1
Cadmium	ppm	ASTM D5185m		0	0	0
ADDITIVES		method	limit/base	current	history1	history2
ADDITIVES Boron	ppm	method ASTM D5185m	limit/base	current 6	history1 4	history2 <1
	ppm ppm		limit/base			
Boron		ASTM D5185m	limit/base	6	4	<1
Boron Barium	ppm	ASTM D5185m ASTM D5185m	limit/base	6 0	4	<1 0
Boron Barium Molybdenum	ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	6 0 <1	4 0 2	<1 0 2
Boron Barium Molybdenum Manganese	ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	6 0 <1 <1	4 0 2 0	<1 0 2 <1
Boron Barium Molybdenum Manganese Magnesium Calcium	ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	6 0 <1 <1 23	4 0 2 0 30	<1 0 2 <1 12
Boron Barium Molybdenum Manganese Magnesium	ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	6 0 <1 <1 23 1943	4 0 2 0 30 1983	<1 0 2 <1 12 1793
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	limit/base	6 0 <1 23 1943 300	4 0 2 0 30 1983 299	<1 0 2 <1 12 1793 276
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	6 0 <1 23 1943 300 376	4 0 2 0 30 1983 299 391	<1 0 2 <1 12 1793 276 346 2606
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	6 0 <1 23 1943 300 376 2918	4 0 2 0 30 1983 299 391 2782	<1 0 2 <1 12 1793 276 346 2606
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m	limit/base	6 0 <1 23 1943 300 376 2918 Current	4 0 2 0 30 1983 299 391 2782 history1	<1 0 2 <1 12 1793 276 346 2606 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m method ASTM D5185m	limit/base >181	6 0 <1 <1 23 1943 300 376 2918 current • 201	4 0 2 0 30 1983 299 391 2782 history1 202	<1 0 2 <1 12 1793 276 346 2606 history2 138
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m ASTM D5185m method ASTM D5185m ASTM D5185m	limit/base >181	6 0 <1 23 1943 300 376 2918 Current 201 <1	4 0 2 0 30 1983 299 391 2782 history1 ◆ 202 0	<1 0 2 <1 12 1793 276 346 2606 history2 138 1 3
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium	ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	limit/base >181 >20	6 0 <1 <1 23 1943 300 376 2918 Current € 201 <1 <1	4 0 2 0 30 1983 299 391 2782 history1 ◆ 202 0 3 3	<1 0 2 <1 12 1793 276 346 2606 history2 138 1 3
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	limit/base >181 >20 limit/base	6 0 <1 23 1943 300 376 2918 current 201 <1 <1	4 0 2 0 30 1983 299 391 2782	<1 0 2 <1 12 1793 276 346 2606 history2 138 1 3 history2
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot %	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	limit/base >181 >20 limit/base	6 0 <1 23 1943 300 376 2918 current <1 <1 <1 current 0.1	4 0 2 0 30 1983 299 391 2782 bistory1 202 0 3 3 1 2782 bistory1 0.1	<1 0 2 <1 12 1793 276 346 2606 history2 138 1 3 history2 0.1
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot % Nitration	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	limit/base >181 >20 limit/base	6 0 <1 <1 23 1943 300 376 2918 Current <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1 <1	4 0 2 0 30 1983 299 391 2782 bistory1 202 0 3 3 bistory1 0.1 7.0	<1 0 2 <1 12 1793 276 346 2606 history2 138 1 3 history2 0.1 6.6 23.3
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot % Nitration Sulfation	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D5185m	Iimit/base >181 >20 Iimit/base >20 30	6 0 <1 <1 23 1943 300 376 2918 current 201 <1 <1 <1 <1 <1 0.1 6.9 25.8	4 0 2 0 30 1983 299 391 2782 bistory1 2782 0 391 2782 0 391 2782 0 101 3 0.1 0.1 0.1 7.0 25.3	<1 0 2 <1 12 1793 276 346 2606 history2 138 1 3 history2 0.1 6.6 23.3
Boron Barium Molybdenum Manganese Magnesium Calcium Phosphorus Zinc Sulfur CONTAMINANTS Silicon Sodium Potassium INFRA-RED Soot % Nitration Sulfation	ppm ppm ppm ppm ppm ppm ppm ppm ppm ppm	ASTM D5185m ASTM D7844 *ASTM D7844	limit/base >181 >20 limit/base >20 >30 limit/base >25	6 0 <1 <1 23 1943 300 376 2918 Current € 201 <1 <1 <1 0.1 6.9 25.8	4 0 2 0 30 1983 299 391 2782 bistory1 202 0 3 3 bistory1 0.1 7.0 25.3 bistory1	0 2 <1 12 1793 276 346 2606 history2 138 1 3 history2 0.1 6.6 23.3 history2

DIAGNOSIS Recommendation

We recommend that you drain the oil and perform a filter service on this component if not already done. We recommend an early resample to monitor this condition. (Customer Sample Comment: 700 hour service)

Machine Id

Wear

All component wear rates are normal.

Contamination

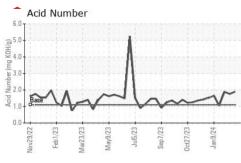
Elemental level of silicon (Si) above normal indicating ingress of seal material.

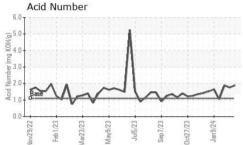
Fluid Condition

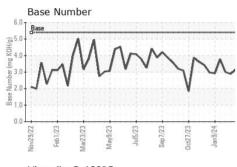
The BN result indicates that there is suitable alkalinity remaining in the oil. The AN level is acceptable for this fluid.

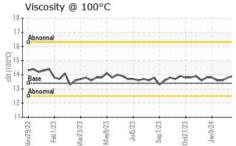


OIL ANALYSIS REPORT









	VISUAL		method	limit/base	current	history1	history2		
	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		
~V~	Debris	scalar	*Visual	NONE	NONE	NONE	NONE		
	Sand/Dirt	scalar	*Visual	NONE	NONE	NONE	NONE		
0ct27/23 Jan9/24	Appearance	scalar	*Visual	NORML	NORML	NORML	NORML		
0 ct3	Odor	scalar	*Visual	NORML	NORML	NORML	NORML		
	Emulsified Water	scalar	*Visual	>0.1	NEG	NEG	NEG		
	Free Water	scalar	*Visual		NEG	NEG	NEG		
	FLUID PROPERT	IES	method	limit/base	current	history1	history2		
	Visc @ 100°C	cSt	ASTM D445	13.4	13.9	13.8	13.6		
nr	GRAPHS								
~	Iron (ppm)			1	Lead (ppm)				
24 -	20 - Severe				Severe				
0ct27/23 Jan9/24	About				0 - Abnormal				
0	15 - d onormal			Шd					
	5 1 1		<u> </u>		5 -				
		\sim	m		In	m	$\sim \sim \sim$		
	Nov29/22 Feb 1/23 Mar23/23 May9/23	Jul5/23	Sep7/23 0ct27/23 .lan9/24		Nov29/22 Feb 1/23 Mar23/23	May9/23 Jul5/23 Sep7/23	0ct27/23 Jan 9/24		
NA.	Nov Mar Ma	'n	Se Oct		Nov Fe	Ma	0ct Ja		
100	Aluminum (ppm)				Chromium (p	pm)			
	12 10				5 Severe				
	8				4 - Abnormal				
/23 -	E 6- Abnormal			mdd					
0ct27/23 Jan9/24				A1	2				
		M	V		0	ma	\sim		
	Vov29/22 Feb1/23 Mar23/23	Jul5/23	Sep7/23 0ct27/23 .Jan9/24		Nov29/22 Feb 1/23 Mar23/23	May9/23 Jul5/23 Sep7/23	Jct27/23 Jan9/24		
	≥ " ≊ ≥ Copper (ppm)		s 90 T		≗ ≝ Silicon (ppm)	≥ , ∽	00 r		
	20 T		10000000000	40		1017101110111	000000000000000000000000000000000000000		
~~~	15 - Severe		4	30	10- A				
	<b>長10</b> -			틆 20	SERAA		·		
	Abnormal			10		$\sim \sim \sim$	v		
Jan9/24 -	22	A	1	-		in a line line in	and a bar ware		
0ct27/23 Jan9/24	ov29/22 0	Jul5/23 -	//23 -		0,223	May9,23 - Jul5,23 -	//23 -		
	Nov29/22 Feb1/23 Mar23/23	Jul	Sep7/23 Oct27/23 .Jan9/24		Nov29/22 Feb 1/23 Mar23/23	May9/23 Jul5/23 Sep7/23	0ct27/23 Jan9/24		
	Viscosity @ 100°C Base Number								
	Abnormal		THE REAL PROPERTY AND A	0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,					
	Abnormal Abnormal			OX BE	οΛ/	Inn			
	Base			ger 3.			YN		
	弦 12- 12-				.0				
	10			0	.0				
	Nov29/22 Feb1/23 Mar23/23	Jul5/23	Sep7/23 . 0ct27/23 . .lan9/24 .		Nov29/22 Feb 1/23 Mar23/23	May9/23 Jul5/23 Sep7/23	0ct27/23 Jan9/24		
	No F Mi	1	ŏ		No F Ma	× . «	ŏ		
Laboratory	: WearCheck USA - 501				<b>-</b> · -		ips-Brent Run		
Sample No. Lab Number	: WC0776702 : 06098624	Recei Teste		Feb 2024 Feb 2024	Brent Ru	n Power Station, 8	383 Vienna Road Montrose, MI		
	er : 10896854 Diagnosed : 26 Feb 2024 US 48457-								
Test Package		-				Conta	ct: Rob Stewart		
	+ + O + O		00 007 1060	•	Dala Cha	wort@oporgudo			

Test Package : MOB 2 Certificate L2367

To discuss this sample report, contact Customer Service at 1-800-237-1369. Rob.Stewart@energydevelopments.com * - 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: